



**CDC® CYBER
845S, 855S, 840A, 850A, AND 860A
COMPUTER SYSTEMS**

INSTALLATION AND CHECKOUT

HARDWARE REFERENCE MANUAL

REVISION RECORD

REVISION	DESCRIPTION
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B (01-16-87)	Manual revised to incorporate ECO 48465. Because extensive changes are made, change bars and dots are not used and all pages reflect the latest revision level. This edition obsoletes all previous editions.
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REVISION LETTERS I, O, Q, S, X AND Z ARE NOT USED.

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St. Paul, Minnesota 55126-6198

or use Comment Sheet in the back of
this manual.

MANUAL TO EQUIPMENT LEVEL CORRELATION SHEET

This manual reflects the equipment configurations listed below.

EXPLANATION: Locate the equipment type and series number, as shown on the equipment FCO log, in the list below. Immediately to the right of the series number is an FCO number. If that number and all of the numbers underneath it match all of the numbers on the equipment FCO log, then this manual accurately reflects the equipment.

EQUIPMENT TYPE	SERIES	WITH FCOs	COMMENTS
AD112-C	03	47130	
AD113-A	03	47130	
AT478-A			
AT481-A			
BS213-A	02	47021	
GH251-C			
GH252-A			
GH480-A			

PREFACE

This manual is for use by experienced field personnel who are familiar with CONTROL DATA® CYBER 845S, 855S, 840A, 850A, and 860A computer systems. The manual provides detailed installation and checkout instructions for the CYBER 845S, 855S, 840A, 850A, and 860A computer systems and their central processor, central memory, and water cooling unit options. These categories comprise the following equipment:

- AD112-C Central processor (CP-0)
 - AD113-A Optional central processor (CP-1)
 - BS213-A Central memory (CM)
 - AT478-A Input/output unit (IOU) NIO
 - AT481-A Optional IOU CIO
 - GH480-A Interbay
 - GH251-C 102-L/min (27-gal/min) water cooling unit for CP-0
 - GH251-C Optional 102-L/min (27-gal/min) water cooling unit for optional CP-1
- or
- GH252-A 220-L/min (58-gal/min) water cooling unit for CP-0 and optional CP-1.
(Replaces both GH251-A water cooling units.)

Most of the manuals referenced within this manual are listed in the system publication index. Manuals and documents referenced within the text but not listed in the system publication index are the following:

<u>Title</u>	<u>Publication Number</u>
MSL 15X Off-Line Maintenance Software Library Reference Manual	60456530
CYBER Initialization Package (CIP) User's Handbook	60457180
NOS and NOS/VE System Validation Suite User's Guide	-

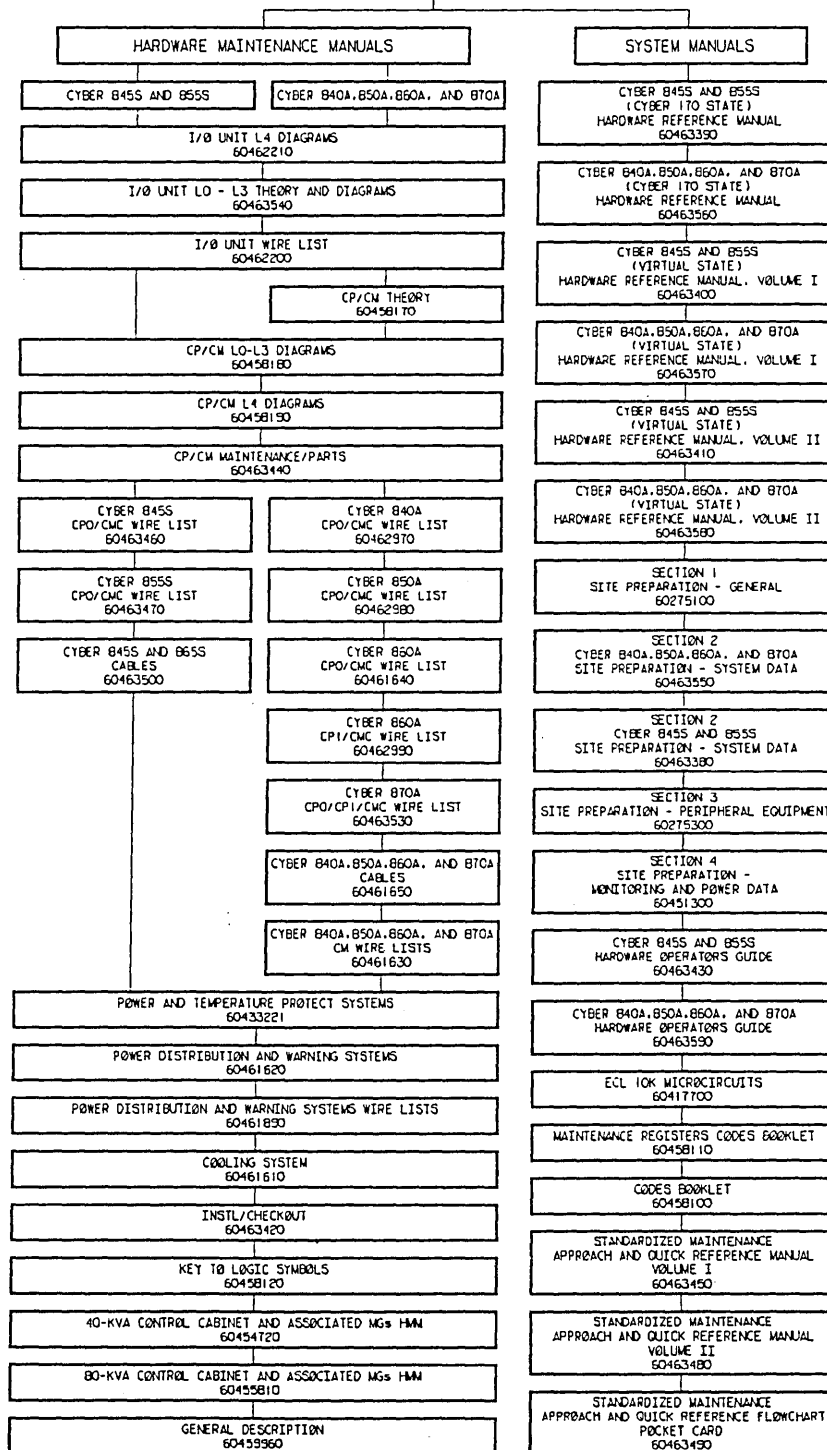
All of the manuals are available from:

Control Data Corporation
Literature and Distribution Services
308 North Dale Street
St. Paul, Minnesota 55103

The latest manual revision levels and ordering information are in the Literature and Distribution Services Catalog, publication number 90310500.

SYSTEM PUBLICATION INDEX

CYBER 845S, 855S, 840A, 850A, 860A, AND 870A
HARDWARE MANUALS



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This manual provides preinstallation, installation, and checkout procedures for CYBER 845S, 855S, 840A, 850A, and 860A computer systems (figure 1-1). Following are descriptions of all the manual sections.

MANUAL SECTIONS

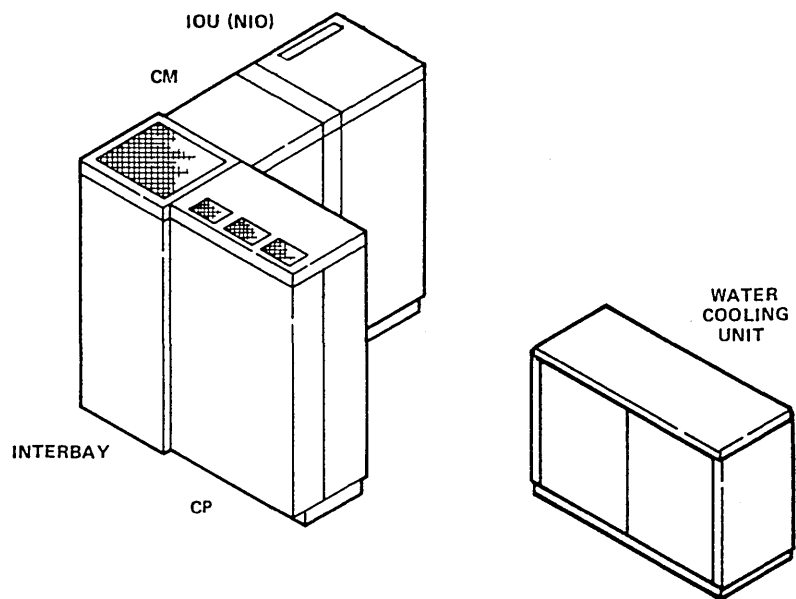
Section 1 (Introduction) provides a brief summary of the manual and its use with installation and checkout flowcharts. The flowcharts are part of this section. They provide the means for a systematic and efficient installation of either a single-CP or a dual-CP central computer.

Section 2 (Preinstallation) lists the special tools and materials required for installation, initial site preparations to be made by the customer following site inspections to be made by Control Data personnel, shipping list examples, and procedures for the installation and checkout of equipment that is shipped early. Early-shipment equipment arrives at the site approximately two weeks before the central computer and requires installation at that time.

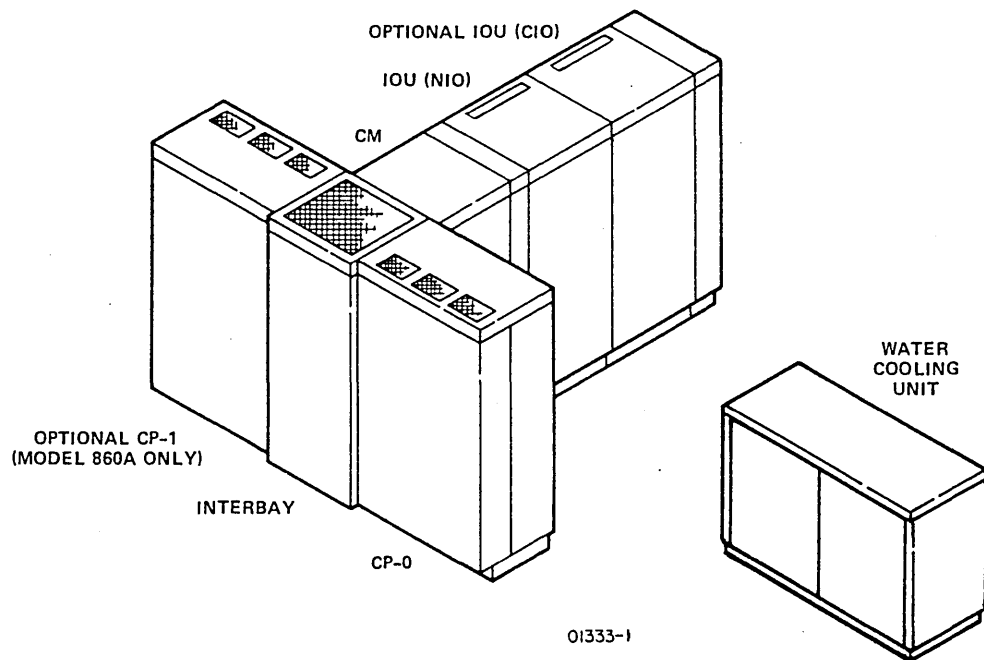
Sections 3 through 5 (Installation) provide individual but simultaneous procedures for two installers and an electrician. The procedures detail the tasks shown on the flowcharts. The installation includes the central computer placement, bolting, cabling, and connections to preinstalled water hoses and power wiring.

Section 6 (Checkout) describes systematic procedures for the operational checkout of the central computer. The checkout includes the installation and running of diagnostic tests, final confidence tests, checking of the warning system, and checking of local and remote maintenance capabilities.

845S AND 855S



840A, 850A, AND 860A



01333-1

Figure 1-1. CYBER 845S, 855S, 840A, 850A, and 860A Central Computers

USE OF MANUAL AND FLOWCHARTS (Sheet 1 of 3)

This manual is for use with the flowcharts shown on the following pages. The flowcharts show the tasks required for installation and checkout of the mainframe complex. This complex consists of the central processor (CP-0), optional CP (CP-1), input/output unit (IOU), central memory (CM), optional CM, water cooling unit(s), display station, and system power monitor (SPM).

NOTE

The installation of the computing system peripheral equipment is considered to be a parallel process to that of the mainframe complex. The peripheral equipment installation is therefore not part of the following flowcharts and must be independently planned.

The flowcharts define the number of installers, their tasks, and the approximate times required to perform the tasks. These tasks correspond directly to major headings within the manual, which permits easy access to detailed procedures.

Use of the manual and the applicable flowchart includes the following steps.

Before arrival of the central computer at the site:

- Installers must become thoroughly familiar with the installation process, as shown on the installation and checkout flowchart.
- Each of the two installers and the electrician must read and understand the procedures that correspond to his or her installation and checkout assignment.

Before starting the installation:

- Each installer must remove his or her individual section from the manual and place it in a separate loose-leaf binder, which is shipped with the equipment.
- One of the installers must mount the flowchart from the manual on a wall or other surface that will be readily visible during the installation.

USE OF MANUAL AND FLOWCHARTS (Sheet 2 of 3)

During the installation:

WARNING

Deviation from the installation and checkout flowchart (for example, performing serial steps in parallel) may result in unnecessary delays, damage to the equipment, or personal injury.

- Each installer must perform his or her tasks in the order shown on the flowchart and as detailed in the manual procedures. This ensures the most systematic and efficient installation and checkout process.
- At the completion of each task, the installer(s) who performed the task must record on the flowchart the time required to perform it.

After completing the installation:

- Each installer must return his or her installation section to the installation and checkout manual. The resulting spare loose-leaf binders may then be used for other system manuals.
- An installer must review and, if necessary, update the installation portion of the flowchart to ensure that it is completely filled out.

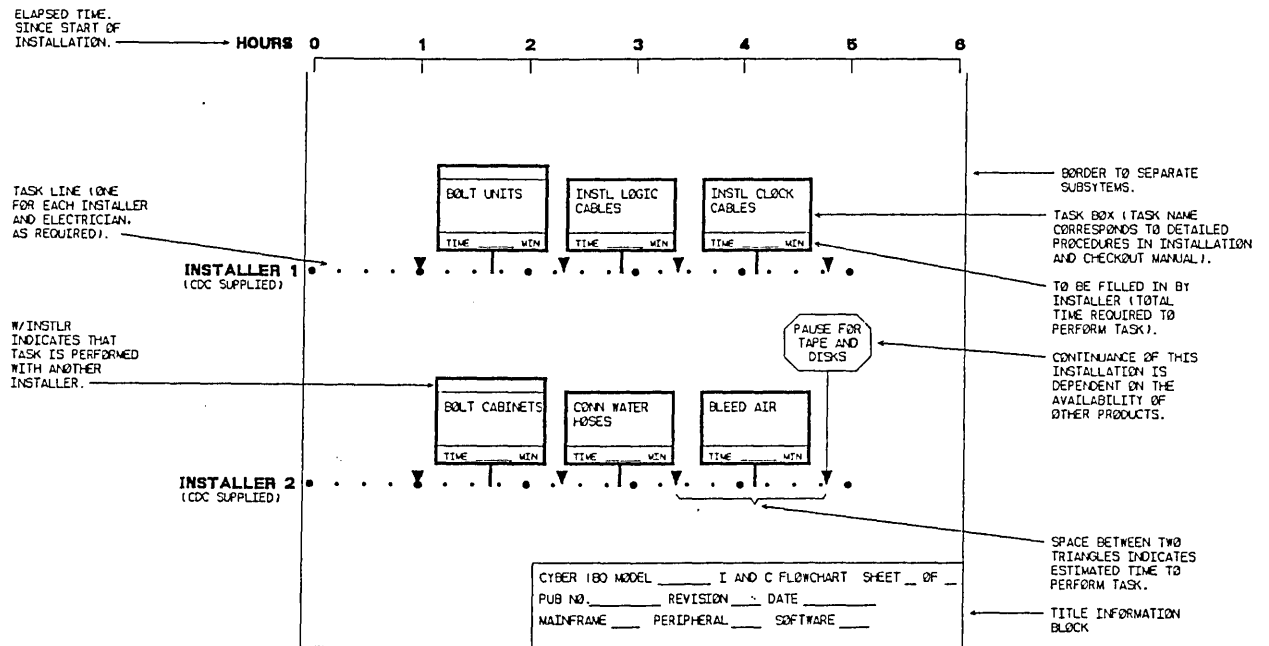
During the checkout:

- The installers who perform the checkout tasks perform them together, in the order shown on the flowchart and as detailed in the manual procedures.
- At the completion of each task, one of the installers must record on the flowchart the time required to perform it.

After completing the checkout:

- An installer must review and, if necessary, update the checkout portion of the flowchart to ensure that it is completely filled out.
- An installer must include the complete installation and checkout flowchart with an installation report that is returned to Control Data.

USE OF MANUAL AND FLOWCHARTS (Sheet 3 of 3)

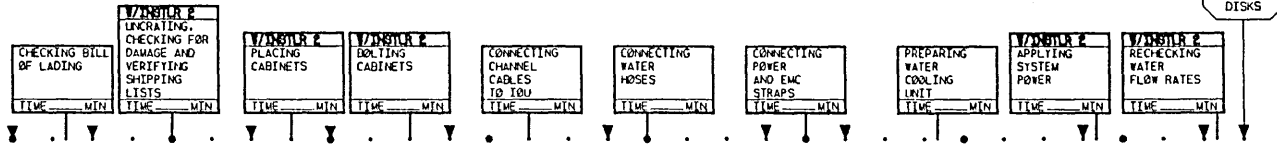
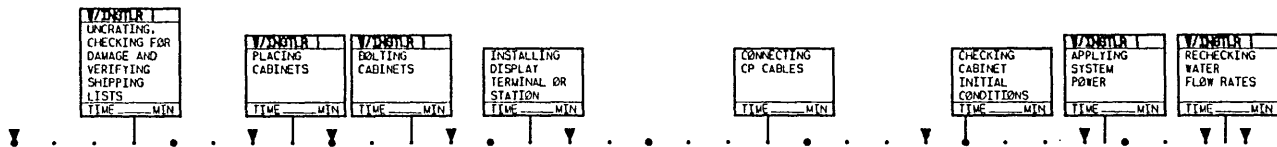
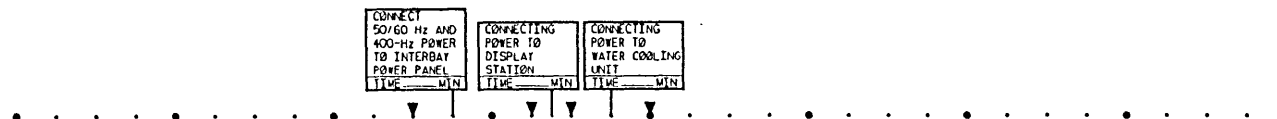


Installation and Checkout Flowchart Instruction Sheet

CYBER 845S, 855S, 840A, 850A, AND 860A INSTALLATION AND CHECKOUT FLOWCHART (SHEET 1 OF 2)

HOURS

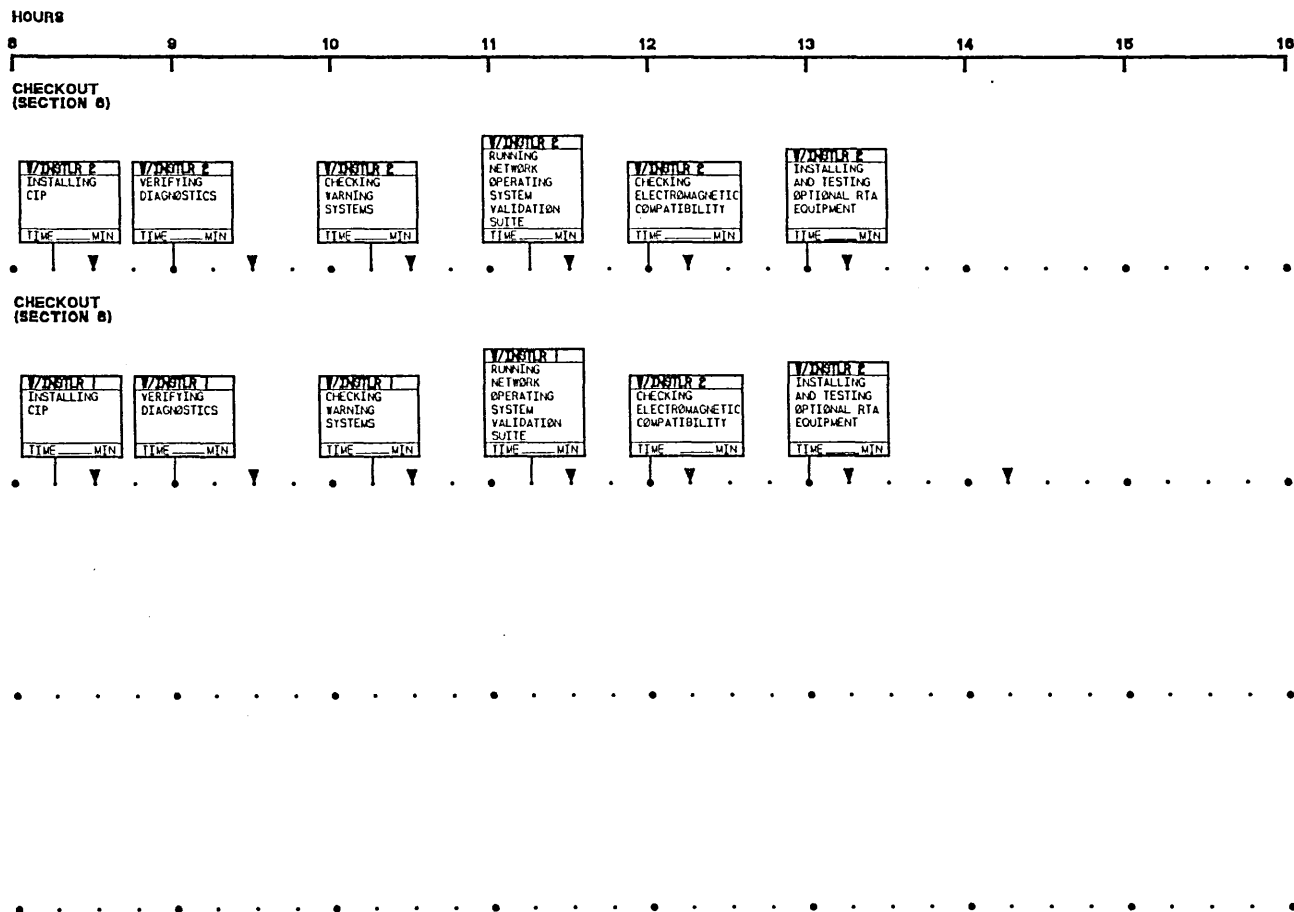
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INSTALLER 1
(SECTION 3)INSTALLER 2
(SECTION 4)ELECTRICIAN
(SECTION 5)

CYBER 845S, 855S, 840A, 850A, AND 860A
INSTALLATION AND CHECKOUT FLOWCHART (SHEET 1 OF 2)
PUBLICATION NO. 60463420 REVISION A
MAINFRAME ☒ PERIPHERAL ☐ SOFTWARE ☐ DATE 06/25/86

M30 845S 855S 1

CYBER 8455, 8555, 840A, 850A, AND 860A INSTALLATION AND CHECKOUT FLOWCHART (SHEET 2 OF 2)



CYBER 8455, 8555, 840A, 850A, AND 860A
INSTALLATION AND CHECKOUT FLOWCHART (SHEET 2 OF 2)

PUBLICATION NO. 60463420 REVISION A
MAINFRAME X PERIPHERAL SOFTWARE DATE 06/25/86

M30 8455 8555 2

This section contains the initial site preparations required prior to the arrival of the central computer. The preparations include some tasks that are performed by the customer and some that are performed by Control Data personnel. Completion of all the preinstallation tasks prepares the site for installation and checkout of the central computer. These tasks are the following:

- Obtaining special tools and equipment
- Preparing the site for preinstallation
- Inspecting the site
- Checking bill of lading for preinstallation equipment
- Uncrating, checking for damage, and verifying shipping lists
- Installing water hose assemblies, manifolds, and hoses
- Checking SPM preoperating conditions
- Checking SPM operation with M-G set
- Placing SPM cables

Tools and parts required for the tasks include the following:

Diagonal cutter or knife

Site supply water hose assembly for each water cooling unit

Site return water hose assembly for each water cooling unit

Two 5/8-in-diameter, 3-m (10-ft) water hoses

Masking tape

Cable tie identifiers

Erasable programmable read only memory (EPROM) PN 22109583

Terminator plug PN 53582695

Antistatic wrist strap

System power monitor cables:

One PN 23107064
Two PN 23141055
Three PN 53615357

Water manifolds and hoses:

- For central processor configuration with a 102 L/M (27 gal/min) water cooling unit:

With CP-0, CM, and IOU NIO cabinet:

Two sets of three-port supply and return water manifolds
Two supply and one return water hoses, 1-in-diameter, 9.1 m (30 ft)
Two supply and one return water hoses, 2-in-diameter, 3 m (10 ft)
Ten supply and return water hoses, 3/4-in-diameter, 2.4 m (8 ft)

With optional IOU CIO cabinet:

Two supply and return water hoses, 3/4-in-diameter, 2.4 m (8 ft)

With optional CP-1, a second 102 L/min (27 gal/min) water cooling unit is required and:

One set of three-port supply and return water manifolds
Two supply and one return water hoses, 1-in-diameter, 9.1 m (30 ft)
Six supply and return water hoses, 3/4-in-diameter, 2.4 m (8 ft)

- For a central processor configuration with a 220 L/min (58 gal/min) water cooling unit:

With CP-0, CM, and IOU NIO cabinet:

Two sets of three-port supply and return water manifolds
One set of five-port supply and return water manifolds
Two supply and one return water hoses, 2-in-diameter, 7.6 m (25 ft)
Four supply and two return water hoses, 1-in-diameter, 1.8 m (6 ft)
Ten supply and return water hoses, 3/4-in-diameter, 2.4 m (8 ft)

With optional CP-1:

One set of three-port supply and return water manifolds
Two supply and one return water hoses, 1-in-diameter, 1.8 m (6 ft)
Six supply and return water hoses, 3/4-in-diameter, 2.4 m (8 ft)

OBTAINING SPECIAL TOOLS AND EQUIPMENT (Sheet 1 of 3)

Table 2-1 lists the special tools, test equipment, and materials essential to the installation of the central computer. These items must be at the computer site prior to the arrival of the central computer.

NOTE

The table does not include maintenance and troubleshooting tools. These tools require ordering from the ORMIC (operational model for maintenance inventory control) parts list.

Table 2-1. Special Tools, Equipment, and Materials (Sheet 1 of 3)

Quantity	Description	Use	Part Number	Note
4	Antistatic wrist strap, small	Connecting cables	12263623	1
4	Antistatic wrist strap, large	Connecting cables	12263496	1
1	Local terminal cable	Connecting local terminal to IOU Unshielded Shielded	19266318 19268593	1
1	Aerosol coolant	Warning system checks	12210068	
1	CAMS 11 Miftape	EMC grounding checks	12322211	
2	Cam-action roller	Positioning central computer cabinets	Tool number 00218742	2
1	Differential pressure gauge	Measuring site flow rate	53812062	2
57 L (15 gal)	Distilled water	Filling 102-L/min (27 gal/min) water cooling unit	None	4, 7
57 L (15 gal)	Distilled water	Filling optional 102 L/min (27-gal/min) water cooling unit	None	4, 7

OBTAINING SPECIAL TOOLS AND EQUIPMENT (Sheet 2 of 3)

Table 2-1. Special Tools, Equipment, and Materials (Sheet 2 of 3)

Quantity	Description	Use	Part Number	Note
170 L (45 gal)	Distilled water	Filling optional 220-L/min (58-gal/min) water cooling unit	None	4, 7
1	Water tank drain hose	Draining water from water cooling unit	53705652	1, 7
1	Drift pin	Aligning central computer bolt holes	24931585	1
1	Funnel	Filling water tank	12263461	1
1	Hot air blower heat gun with narrow insulated nozzle	Warning system checks	12262503	1
1	Microfiche listing of microcode	Microcode description		2
1	NOS System Validation Suite or	Running final confidence tests	77987603A	
1	NOS/VE System Validation Suite (as applicable)		77987637A	
1	Safety glasses	Protection against Cobratec solution	51730100	1
1	Temperature probe (model 80T-150F)	Measuring site chilled water temperature	12263445	1
1	Multimeter, John Fluke model 8020A or equivalent	General use	12263279	1
1	Disposable gloves (rubber or plastic)	Protection against Cobratec solution	12215195	1

OBTAINING SPECIAL TOOLS AND EQUIPMENT (Sheet 3 of 3)

Table 2-1. Special Tools, Equipment, and Materials (Sheet 3 of 3)

Quantity	Description	Use	Part Number	Note
1	Screwdriver (Phillips, thin, long, magnetic, and insulated)	IOU warning system checks		1
1	Water container, 19.0 L (5 gal)	Bleeding air from CP supply/return water lines	None	5
2	Teflon tape	Sealing threaded pipe connections	67184782	6
2	24-in pipe wrench	Water pipe connections	None	5
2	Roll-a-lifts	Moving and placing central computer cabinets	None	3
<p>Notes:</p> <ol style="list-style-type: none"> 1. Ordered through Control Data by site personnel. 2. Available through Control Data regional technical support, country technical support, or Computer Facility Services. 3. Provided by shipping carrier. 4. Provided by site branch manager. 5. Obtained locally by site personnel. 6. Shipped with equipment. 7. The total quantity of distilled water provided must relate to the type and number of water cooling units in the central computer configuration. 				

PREPARING THE SITE FOR PREINSTALLATION (Sheet 1 of 4)

The customer has the responsibility of making initial site preparations. These preparations include the installation of some Control Data parts and equipment that arrive at the site in early-shipment kits, approximately two weeks before the arrival of the central computer.

Sections 1 through 4 of the site preparation manuals and the MGs HMM (listed in the system publication index in the front of this manual) define site preparations. Additional site preparations may include instructions prepared by Control Data Computer Facility Services (CFS) for the customer.

The following list summarizes the initial site preparations to be performed by the customer.

RAISED-FLOOR INSTALLATION

- ___ 1. Refer to the Section 1 Site Preparation manual for general installation information.
- ___ 2. Use full-size floor template (provided by Control Data) to mark placement of central computer and floor cutouts.
- ___ 3. Cut floor cutouts, determined by floor template, in floor tiles for power wiring, signal cables, and water hoses. To ensure that central computer will sit flat, floor cutouts must not have edging that protrudes above floor surface.

AIR CONDITIONING INSTALLATION

- ___ 1. Refer to the Section 1 Site Preparation manual for general installation information.
- ___ 2. Refer to the Sections 2 and 3 Site Preparation manuals and the Control Data Machine Unit Specification (provided by Control Data CFS) for detailed equipment cooling requirements.

WATER LINE INSTALLATIONS

- ___ 1. Refer to the Section 2 Site Preparation manual for installation information.
- ___ 2. Install site water supply and return lines so that ends of lines are a maximum of 2.1 m (7 ft) from water cooling unit connections. Water lines must have insulation to prevent water condensation.

CAUTION

The site supply and return water lines must be flushed clean and free of debris to prevent possible damage to the water cooling unit(s) and IOU condensing unit.

- ___ 3. Flush site water supply and return lines to ensure that they are free of air and debris.

PREPARING THE SITE FOR PREINSTALLATION (Sheet 2 of 4)

- ___ 4. Install quick-connect couplings (provided by Control Data) on close nipples (provided by customer) at ends of site water supply and return lines. The quick-connect couplings are part of an early-shipment kit that arrives at the site approximately two weeks before the central computer.

WALL-MOUNTED POWER BOX INSTALLATIONS

- ___ 1. Refer to the site power distribution diagram (provided by site planner) and install customer-supplied items such as 50/60- and 400-Hz power disconnects, circuit breakers, and emergency off switches.
- ___ 2. Refer to the Section 4 Site Preparation manual to install the SPM (provided by Control Data), terminator power supply, peripheral power control assembly, and temperature and humidity recorder (provided by Control Data when part of purchased equipment). These items are part of an early-shipment kit that arrives at the site approximately two weeks before the central computer.
- ___ 3. Depending on the site, the customer may opt to keep the computer room walls clear of extraneous wall-mounted installations. When this is the case, the SPM can be mounted inside a remote power island on the floor. With this option, the customer provides the power island. The power island must meet all of the requirements of a wall-mounted SPM and allow clearance for ample air circulation and residual heat dissipation.

M-G SET INSTALLATION AND LOCAL TESTING

- ___ 1. Refer to the Section 1 Site Preparation manual for general installation information.
- ___ 2. Refer to the Section 4 Site Preparation manual for M-G set specification sheets.
- ___ 3. Refer to the MGs HMM for detailed installation and testing when the M-G set is a Control Data product. Ensure that M-G testing includes a check for proper rotation.

50/60-Hz AND 400-Hz POWER DISTRIBUTION INSTALLATION

- ___ 1. Refer to the Sections 1 through 4 Site Preparation manuals for general installation information.
- ___ 2. Refer to figure 2-1 for electrical connections to the A2 terminal board in the SPM. More detailed descriptions of these terminal board connections are in the Power Distribution and Warning System manual (publication number 60455920) listed in the system publication index in the front of this manual.

PREPARING THE SITE FOR PREINSTALLATION (Sheet 3 of 4)

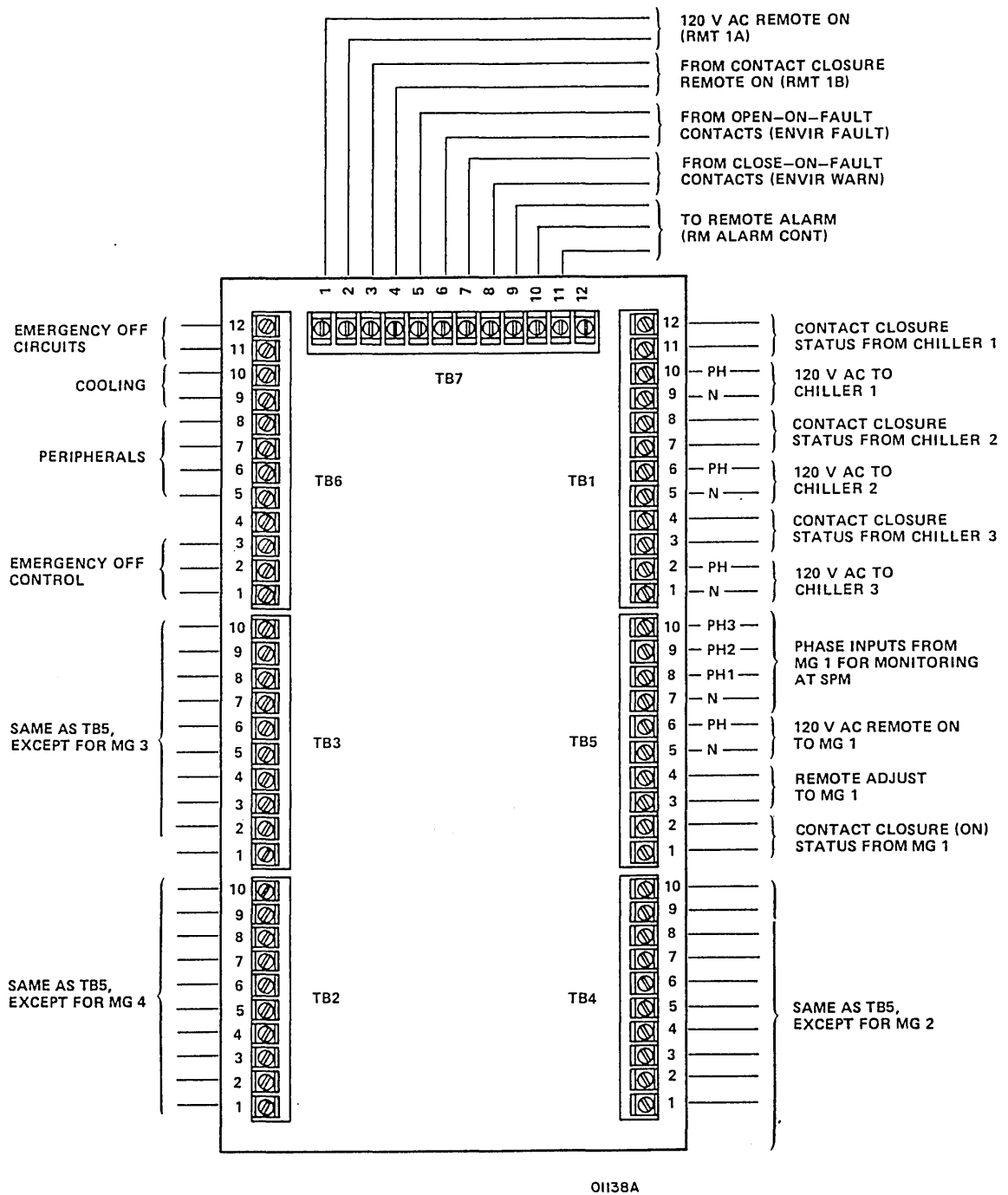


Figure 2-1. A2 Terminal Board Connections in the SPM

PREPARING THE SITE FOR PREINSTALLATION (Sheet 4 of 4)

- ___ 3. Perform site power wiring as detailed on the site power distribution diagram (provided by site planner). Additionally, this wiring includes the following:
 - ___ a. Connecting power plugs (supplied by Control Data in early-shipment kit) to the power wiring ends that go to the water cooling unit(s), unless local electrical codes require direct-wired power connections. For 50-Hz, 3-ph, 20-A circuits, use Hubbel connector 516C6W. For 60-Hz, 3-ph, 20-A circuits, use Hubbell connector 520C9W.
 - ___ b. Providing ground-lug connections on the raised-floor grid for connections of braided grounding straps from the equipment, if optional EMC grounding is to be used.
 - ___ c. Connecting a braided ground strap from the E2 EMC GND in the SPM to the raised-floor grid, when optional EMC grounding is used.

TELEPHONE AND MODEM INSTALLATION

- ___ 1. Provide and install a telephone and a modem near the system display station for use in remote technical assistance.

INSPECTING THE SITE (Sheet 1 of 2)

Use this procedure as a general guide for inspecting the site power wiring, water lines, air conditioning, and floor cutouts to ensure that the site is ready for the central computer installation.

RAISED-FLOOR INSPECTION

- ___ 1. Use full-sized floor template (provided by Control Data) to verify correct location of floor cutouts.
- ___ 2. Use template to verify that central computer outline is accurately marked on floor to ensure exact placement of units during installation.

AIR CONDITIONING INSPECTION

- ___ 1. Check with customer that site air conditioning is operable.

WATER LINE INSPECTION

- ___ 1. Measure distance between ends of site water lines and planned water cooling unit location(s) to ensure that distance is a maximum of 2.1 m (7 ft). This permits water hose assemblies to reach cooling unit(s).
- ___ 2. Observe that quick-coupling adapters (supplied with preinstallation parts and equipment) are installed on ends of site water supply and return lines.

POWER INSPECTION

- ___ 1. Make sure that all 50/60-Hz and 400-Hz power to all preinstalled equipment, wall-mounted boxes, and power runs is shut off.

NOTE

Any electrical work resulting from the following inspection must be made by a licensed electrician according to local codes.

- ___ 2. Obtain site power distribution diagram (prepared by site planner) from site personnel. Verify that all wiring is correct by comparing it to diagram. Have any wiring errors corrected. This wiring includes the following:
 - ___ a. Power and sensing wires to the M-G set. For Control Data M-G sets, detailed power wiring connections are in the 40-kVA and 80-kVA Control Cabinet and Associated MGs manuals listed in the system publication index.

INSPECTING THE SITE (Sheet 2 of 2)

- ___ b. Power and sensing wires to the SPM. These wires must be shielded or run in separate conduits. Detailed power wiring connections to the SPM are in the Section 2 Site Preparation manual listed in the system publication index.
- ___ c. Power and sensing wires to the floor cutouts for the water cooling unit(s). Detailed power wiring connections to the water cooling unit(s) are in the Power Distribution and Warning System manual (publication number 60455920) listed in the system publication index.
- ___ d. Power wiring to the floor cutouts for the central computer and the connection of power plugs (supplied by Control Data) as defined by the site planner.
- ___ 3. Inspect all power wiring for obvious damage and for loose connections. Replace any damaged wiring, and tighten any loose connections.
- ___ 4. Check to see that local testing of M-G set is completed.

TELEPHONE AND MODEM INSPECTION

- ___ 1. Check to ensure that a telephone and modem are installed and that they are operational for remote technical assistance use.

CHECKING BILL OF LADING FOR PREINSTALLATION EQUIPMENT (Sheet 1 of 1)

Use this procedure to verify the bill of lading. The bill of lading normally lists the containers of the preinstallation parts and equipment. It arrives with the equipment and in the possession of the carrier. Verification of the bill of lading is necessary immediately upon delivery of the equipment at the site.

- ___ 1. Obtain bill of lading and shipping documents from carrier immediately upon arrival of carrier at the site.
- ___ 2. Verify shipped containers against those recorded on bill of lading.

UNCRATING, CHECKING FOR DAMAGE, AND VERIFYING SHIPPING LISTS (Sheet 1 of 2)

Use this procedure to remove preinstallation equipment from its containers, check its condition, and verify it with the shipping lists. The shipping lists arrive with the equipment and are normally attached to the outsides of the shipping containers.

Table 2-2 is an example of the shipping list that arrives with the preinstallation equipment. Because the list is only an example, it may vary from the actual list shipped with the equipment. The table must not, therefore, be used for ordering purposes or for verifying complete shipments.

NOTE

Cabinet identification (ID) labels in the following lists are for placement in the equipment, as near as possible to the equipment ID labels.

Tool required:

- Diagonal cutter or knife

Procedure:

1. Remove and read any special uncrating instructions and shipping lists attached to outer surfaces of shipping containers.

WARNING

Use caution when cutting shipping bands from containers to prevent the bands from snapping outward and causing personal injury.

2. Cut shipping bands and open containers.
3. Compare contents of containers with shipping lists attached to containers. Report any missing parts or equipment promptly to carrier and to Control Data.
4. Inspect parts and equipment for damage. Report any damaged equipment or parts promptly to carrier and to Control Data.
5. Acknowledge a complete shipment by signing carrier's bill of lading.

UNCRATING, CHECKING FOR DAMAGE, AND VERIFYING SHIPPING LISTS (Sheet 2 of 2)

Table 2-2. Example of Preinstallation Shipping List

Part Number	Quantity	Part Description
22935112	1	Preinstallation Kit - GM177-A:
10124208	1	Form-ECO log, 8-1/2 x 11
18989211	Ref	Label - ID, equip, ARHOPS
21961320	15	Water - distilled, (1 gal)
24501808	24	Wire elect solid copper 20 ga
24620078	2	Tag, warning
53321477	1	Hose return assembly
53321478	1	Hose supply assembly
53593151	1	Manifold return extension
53593152	1	Manifold supply extension
67033026	2	Coupler-cam coupling 1-1/2
67070521	8	Hose assy-man., 3/4" quick disc
67070528	1	Manifold return under floor
67070529	1	Manifold supply under floor
67070542	1	Hose assy return
67070532	1	Hose assy supply
67328462	1	System power monitor (SPM)
18182800	1	Terminator power supply †
53615357	7	Cable, 15 m (50 ft)
60461660	1	Manual - Installation and Checkout
60462300	1	Manual - Section 2 840, 850, and 860 Site Preparation
17627211	2	Close nipple (6 in)
22824498	1	Cobratec TT-50S (2-oz) bottle
53581615	1	Biocide
53586795	1	Wide range pH test kit
24641251	2	Steel plate, 20 ga, 10 cm x 127 cm (4 in x 50 in)
† Option ordered by customer.		

INSTALLING WATER HOSE ASSEMBLIES, MANIFOLDS, AND HOSES (Sheet 1 of 8)

Placing hoses, manifolds, and other plumbing hardware in their respective positions under the raised floor are preinstallation activities that provide for the later installation of the central computer.

Placing water hoses consists of the following tasks:

- Place water cooling unit site supply and return hose assemblies.
- Place water supply and return manifolds, and connect water cooling unit hoses.

INSTALLING WATER HOSE ASSEMBLIES, MANIFOLDS, AND HOSES (Sheet 2 of 8)

PLACE WATER COOLING UNIT SITE SUPPLY AND RETURN WATER HOSE ASSEMBLIES

Use this procedure to connect supply and return water hose assemblies to the site supply and return water valves and to place the unconnected hose assembly ends near the floor cutouts for the water cooling unit.

Procedure prerequisites:

- Customer has installed site water supply and return lines and flushed them free of air and debris.
- Customer has installed quick couplings on the ends of the site water supply and return lines.

Parts required:

- One site supply water hose assembly for each water cooling unit
- One site return water hose assembly for each water cooling unit

Procedure:

- ___ 1. Remove raised-floor tiles between site supply and return water valves and floor cutout for water cooling unit.
- ___ 2. Place supply and return hose assemblies (figure 2-2) under raised floor between site water valves and water cooling unit water cutout.

NOTE

Be sure to connect the SUPPLY coupling to the site supply valve and the RETURN coupling to the site return valve. The water cooling unit does not function properly if these connections are reversed.

- ___ 3. Connect SUPPLY quick coupling on supply hose assembly to quick coupling on site supply water valve. Close both cam levers on quick coupling.
- ___ 4. Insert wire of warning tag, supplied with hose assemblies, through holes in both cam levers on quick coupling. Twist wire ends tightly together.
- ___ 5. Connect RETURN quick coupling on return hose assembly to quick coupling on site return water valve. Close both cam levers on quick coupling.
- ___ 6. Insert wire of warning tag, supplied with coupling, through holes in both cam levers on quick coupling. Twist wire ends tightly together.
- ___ 7. Remove acid flush drain valve cover and check that valve is closed (fully clockwise) on both supply and return hose assemblies. Replace covers.
- ___ 8. Repeat procedure for second water cooling unit, if applicable.
- ___ 9. Install floor tiles.

INSTALLING WATER HOSE ASSEMBLIES, MANIFOLDS, AND HOSES (Sheet 3 of 8)

PLACE WATER COOLING UNIT SITE SUPPLY AND RETURN WATER HOSE ASSEMBLIES (Cont'd)

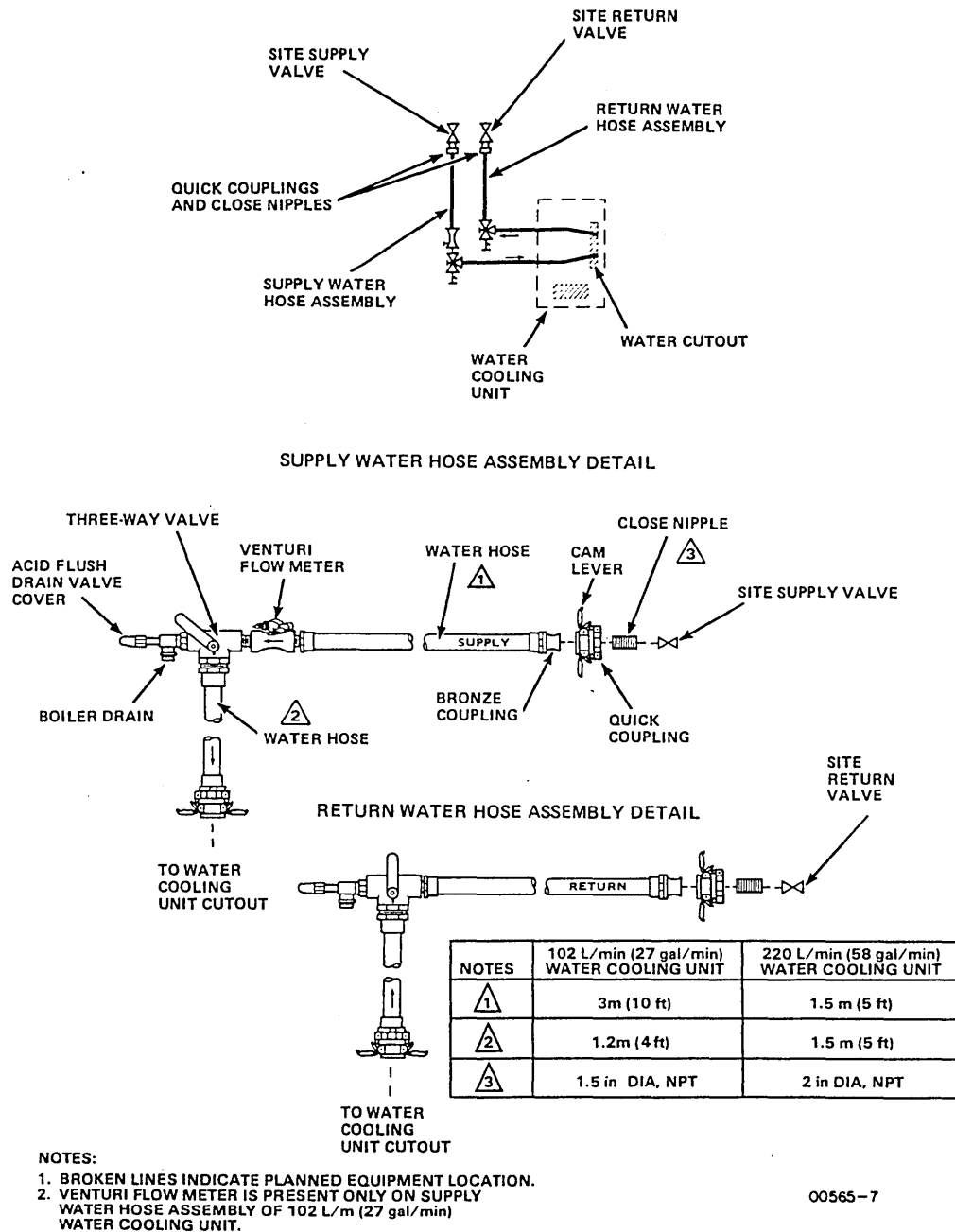


Figure 2-2. Water Cooling Unit Site Supply and Return Hose Assemblies

INSTALLING WATER HOSE ASSEMBLIES, MANIFOLDS, AND HOSES (Sheet 4 of 8)

PLACE WATER SUPPLY AND RETURN MANIFOLDS, AND CONNECT WATER COOLING UNIT HOSES .

Use this procedure to place water manifolds for both CP-0 and optional CP-1, to connect water hoses to the manifolds and place the hoses ends at to the floor locations for the water cooling units, and to connect CP hoses to the manifolds and place the hose ends at the floor cutouts for the CP units.

Parts required:

- Masking tape
- For central processor configuration with a 102 L/M (27 gal/min) water cooling unit:

With CP-0, CM, and IOU NIO cabinet:

Two sets of three-port supply and return water manifolds
Two supply and one return water hoses, 1-in-diameter, 9.1 m (30 ft)
Two supply and one return water hoses, 2-in-diameter, 3 m (10 ft)
Ten supply and return water hoses, 3/4-in-diameter, 2.4 m (8 ft)

With optional IOU CIO cabinet:

Two supply and return water hoses, 3/4-in-diameter, 2.4 m (8 ft)

With optional CP-1, a second 102 L/min (27 gal/min) water cooling unit is required and:

One set of three-port supply and return water manifolds
Two supply and one return water hoses, 1-in-diameter, 9.1 m (30 ft)
Six supply and return water hoses, 3/4-in-diameter, 2.4 m (8 ft)

- For a central processor configuration with a 220 L/min (58 gal/min) water cooling unit:

With CP-0, CM, and IOU NIO cabinet:

Two sets of three-port supply and return water manifolds
One set of five-port supply and return water manifolds
Two supply and one return water hoses, 2-in-diameter, 7.6 m (25 ft)
Four supply and two return water hoses, 1-in-diameter, 1.8 m (6 ft)
Ten supply and return water hoses, 3/4-in-diameter, 2.4m (8 ft)

With optional CP-1:

One set of three-port supply and return water manifolds
Two supply and one return water hoses, 1-in-diameter, 1.8 m (6 ft)
Six supply and return water hoses, 3/4-in-diameter, 2.4 m (8 ft)

INSTALLING WATER HOSE ASSEMBLIES, MANIFOLDS, AND HOSES (Sheet 5 of 8)

PLACE WATER SUPPLY AND RETURN MANIFOLDS, AND CONNECT WATER COOLING UNIT HOSES (Cont'd)

DOES CENTRAL COMPUTER CONFIGURATION INCLUDE A 102 L/min (27 gal/min)
WATER COOLING UNIT?

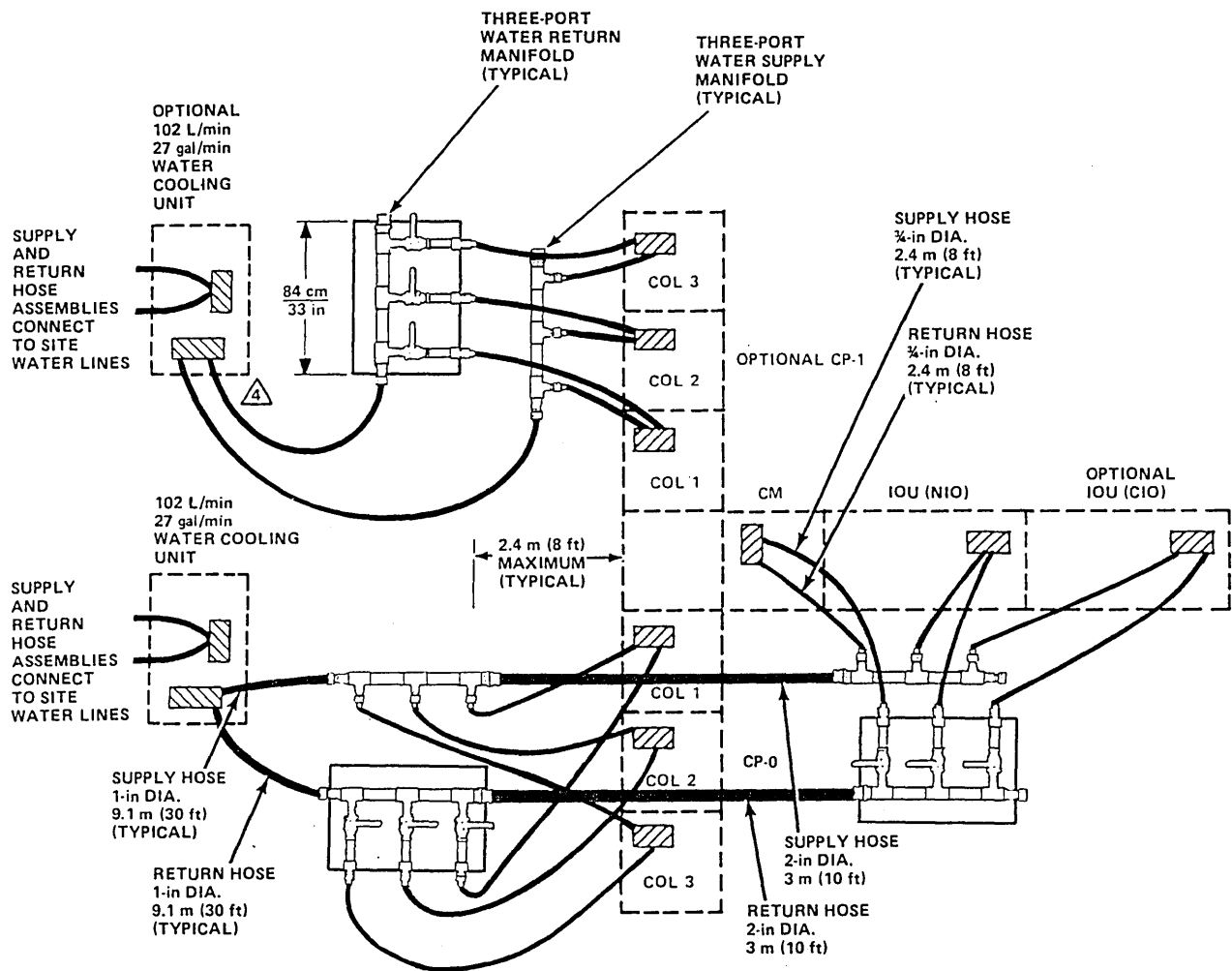
- If yes, continue with step 1.
- If no, go to next question in this procedure.

Procedure:

- ___ 1. Remove raised-floor tiles between water cooling unit(s) and central processor CP-0 and optional CP-1 water cutouts in floor.
- ___ 2. Select under-floor locations for three-port water manifolds (figure 2-3).
- ___ 3. Place water manifolds at under-floor locations.
- ___ 4. Connect 1-in diameter, 9.1 m (30 ft) and 2-in diameter (10 ft) water hoses as shown in figure 2-4.
- ___ 5. Label quick disconnects on water manifolds to identify them with central processor cabinets and columns. Use masking tape or equivalent for labeling.
- ___ 6. Connect 3/4-in diameter, 2.4 m (8 ft) hoses to water supply and return manifolds.
- ___ 7. Label unconnected hose ends to correspond with their central processor cabinet and column destinations. Use masking tape or its equivalent for labeling.
- ___ 8. Route hoses to water cutouts in floor for CP-0, CP-1, CM, and IOU.
- ___ 9. Tape unconnected pairs of supply and return hose ends together temporarily to prevent their entanglement prior to final connection.
- ___ 10. Install Equipment No. label on one of three-port water manifolds. This label identifies the early-ship kit. It is a self-stick label that is part of the early-ship kit.
- ___ 11. Install floor tiles.

INSTALLING WATER HOSE ASSEMBLIES, MANIFOLDS, AND HOSES (Sheet 6 of 8)

PLACE WATER SUPPLY AND RETURN MANIFOLDS, AND CONNECT WATER COOLING UNIT HOSES (Cont'd)



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NOTES:

1. BROKEN LINES INDICATE PLANNED EQUIPMENT LOCATIONS.
2. WATER MANIFOLDS ARE SHOWN SEPARATED FOR CLARITY. IN ACTUAL INSTALLATIONS, THE WATER SUPPLY MANIFOLDS MOUNT DIRECTLY UNDER THE WATER RETURN MANIFOLDS.
3. LOCATIONS OF WATER MANIFOLDS MAY DIFFER FROM THOSE SHOWN DEPENDING UPON AVAILABLE SPACE UNDER RAISED FLOOR.
4. WATER COOLING UNIT, ASSOCIATED WATER MANIFOLDS, AND HOSES ARE REQUIRED ONLY FOR OPTIONAL CP-1.

Figure 2-3. Water Manifolds and Hose Placements for 102-L/min (27-gal/min) Unit

INSTALLING WATER HOSE ASSEMBLIES, MANIFOLDS, AND HOSES (Sheet 7 of 8)

PLACE WATER SUPPLY AND RETURN MANIFOLDS, AND CONNECT WATER COOLING UNIT HOSES (Cont'd)

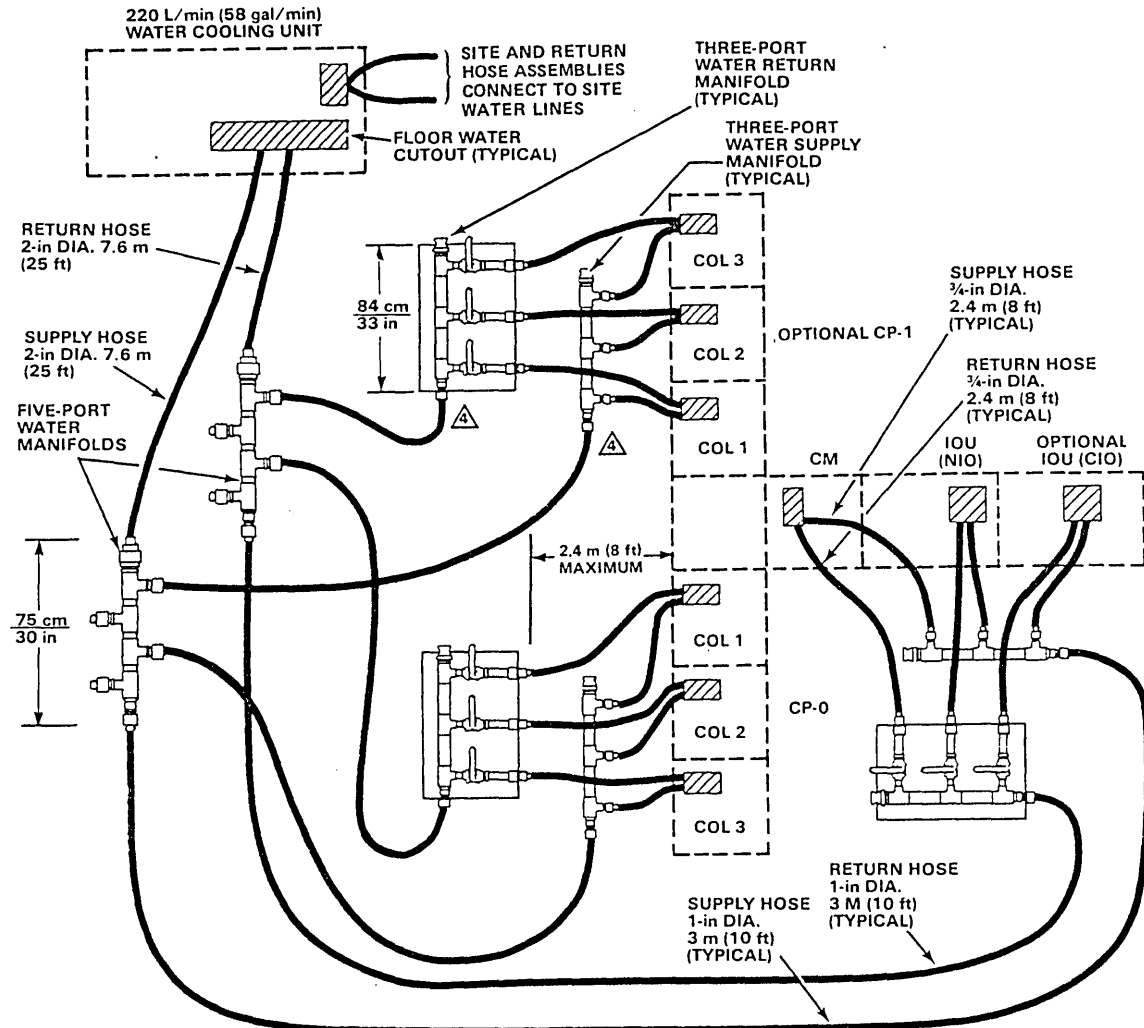
DOES CENTRAL COMPUTER CONFIGURATION INCLUDE A 220-L/min (58-gal/min) WATER COOLING UNIT?

- If yes, continue with step 1.
- If no, ensure completion of procedure for 102-L/min (27 gal/min) water cooling unit(s).

- ___ 1. Remove raised-floor tiles between water cooling unit and central processor water cutouts in floor.
- ___ 2. Select under-floor locations for three-port and five-port water manifolds (figure 2-4).
- ___ 3. Place water manifolds at under-floor locations.
- ___ 4. Verify that gaskets are present in quick couplings on ends of 2-in-diameter 7.6 m (25 ft) hoses.
- ___ 5. Connect 2-in-diameter water hoses to five-port manifolds.
- ___ 6. Insert wire of warning tag, supplied with hoses, through cam levers on quick couplings. Twist wire ends together.
- ___ 7. Verify that cam levers on capped ends of water manifolds are tied together to prevent inadvertent opening of levers.
- ___ 8. Label unconnected ends of hoses to correspond to their supply and return manifold connections, using masking tape or an equivalent label.
- ___ 9. Connect 1-in diameter, 3 m (10 ft) hoses between three-port and five-port manifolds.
- ___ 10. Label quick disconnects on water manifolds to identify them with central processor cabinets and columns. Use masking tape or equivalent for labeling.
- ___ 11. Connect 3/4-in diameter, 2.4 m (8 ft) hoses to water supply and return manifolds.
- ___ 12. Label unconnected hose ends to correspond with their central processor cabinet and column destinations. Use masking tape or its equivalent for labeling.
- ___ 13. Route hoses to water cutouts in floor.
- ___ 14. Tape unconnected pairs of supply and return hose ends together temporarily to prevent their entanglement prior to final connection.
- ___ 15. Install Equipment No. label on five-port manifold. This is a self-stick label that is shipped in the early-shipment kit.
- ___ 16. Install second Equipment No. label on one of the three-port water manifolds.
- ___ 17. Install floor tiles.

INSTALLING WATER HOSE ASSEMBLIES, MANIFOLDS, AND HOSES (Sheet 8 of 8)

PLACE WATER SUPPLY AND RETURN MANIFOLDS, AND CONNECT WATER COOLING UNIT HOSES (Cont'd)



NOTES:

1. BROKEN LINES INDICATE PLANNED EQUIPMENT LOCATIONS.
2. WATER MANIFOLDS ARE SHOWN SEPARATED FOR CLARITY. IN ACTUAL INSTALLATIONS, THE WATER SUPPLY MANIFOLDS MOUNT DIRECTLY UNDER THE WATER RETURN MANIFOLDS.
3. LOCATIONS OF WATER MANIFOLDS MAY DIFFER FROM THOSE SHOWN DEPENDING UPON AVAILABLE SPACE UNDER RAISED FLOOR.

△ WATER MANIFOLD AND ASSOCIATED HOSES ARE REQUIRED ONLY FOR OPTIONAL CP-1.

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Figure 2-4. Water Manifolds and Hose Placements for 220-L/min (58-gal/min) Unit

CHECKING SPM PREOPERATING CONDITIONS (Sheet 1 of 9)

Use this procedure to perform a preliminary check of the system power monitor (SPM) to ensure that its transformer T1 is correctly wired for available site power and that its function switches SN1, SN2, and SN3 are correctly set for the system configuration and site options.

Procedure prerequisites:

- The customer has mounted the SPM and connected its 50/60-Hz power wires and 400-Hz sampling voltage wires.
- Inspection of the site is complete.

Parts and tool required:

- Terminator plug PN 53582695, shipped with SPM.
- Erasable programmable read only memory (EPROM) PN 22109583, shipped with SPM. EPROMs with PNs 23102139 and 23102140 may also be shipped with the SPM but are unused with central CYBER 840, 850, and 860 computer systems.
- Antistatic wrist strap.

Procedure:

CAUTION

The plastic display panel on the front of the SPM scratches easily. If cleaning is required, use a soft tissue and a mild glass cleaner. Rub gently from side to side, not in a circular motion.

- ___ 1. Set wall-mounted circuit breaker that controls the 50/60-Hz power to the SPM to OFF.
- ___ 2. Set wall-mounted circuit breaker that controls 400-Hz sampling voltage to SPM to OFF.
- ___ 3. Set 50/60-Hz circuit breaker to contactors to ON. This circuit breaker may not be present at some computer sites.
- ___ 4. Set SYSTEM DISCONNECT switch on left side of SPM to OFF.
- ___ 5. Remove two retaining screws at right edge of SPM panel and open panel.
- ___ 6. Connect terminator plug (shipped inside SPM) to J12 on bottom of SPM. This connection is temporary. Plug requires removal after checkout of SPM and later connection in central computer interbay.

CHECKING SPM PREOPERATING CONDITIONS (Sheet 2 of 9)

- ___ 7. Verify that a jumper wire connects board assembly A2-TB6-11 to A2-TB6-12 in SPM (figure 2-5). If a room emergency-off switch is part of the installation, jumper wire must be removed and room emergency-off switch must connect to A2-TB6-11 and A2-TB6-12.

CAUTION

Correct connection of the INPUT wires is essential to prevent damage to transformer T1 in SPM.

- ___ 8. Verify transformer T1 wiring connections for available site power as follows:
- ___ a. Locate a white and a yellow wire (both labeled INPUT) in SPM. These wires connect to terminals on T1-TB1.
- ___ b. Verify that INPUT wire connections on T1-TB1 match connections for available site power.
- | | | | | |
|----------------|----|---------|----|---------|
| 60-Hz | | 50-Hz | | 50-Hz |
| 1-phase | or | 1-phase | or | 1-phase |
| 110-V to 120-V | | 220-V | | 240-V |
- ___ c. Change two INPUT wire connections on T1-TB1 (if necessary) to correct transformer wiring, being careful to move only two INPUT wires and leave other terminal wires undisturbed.

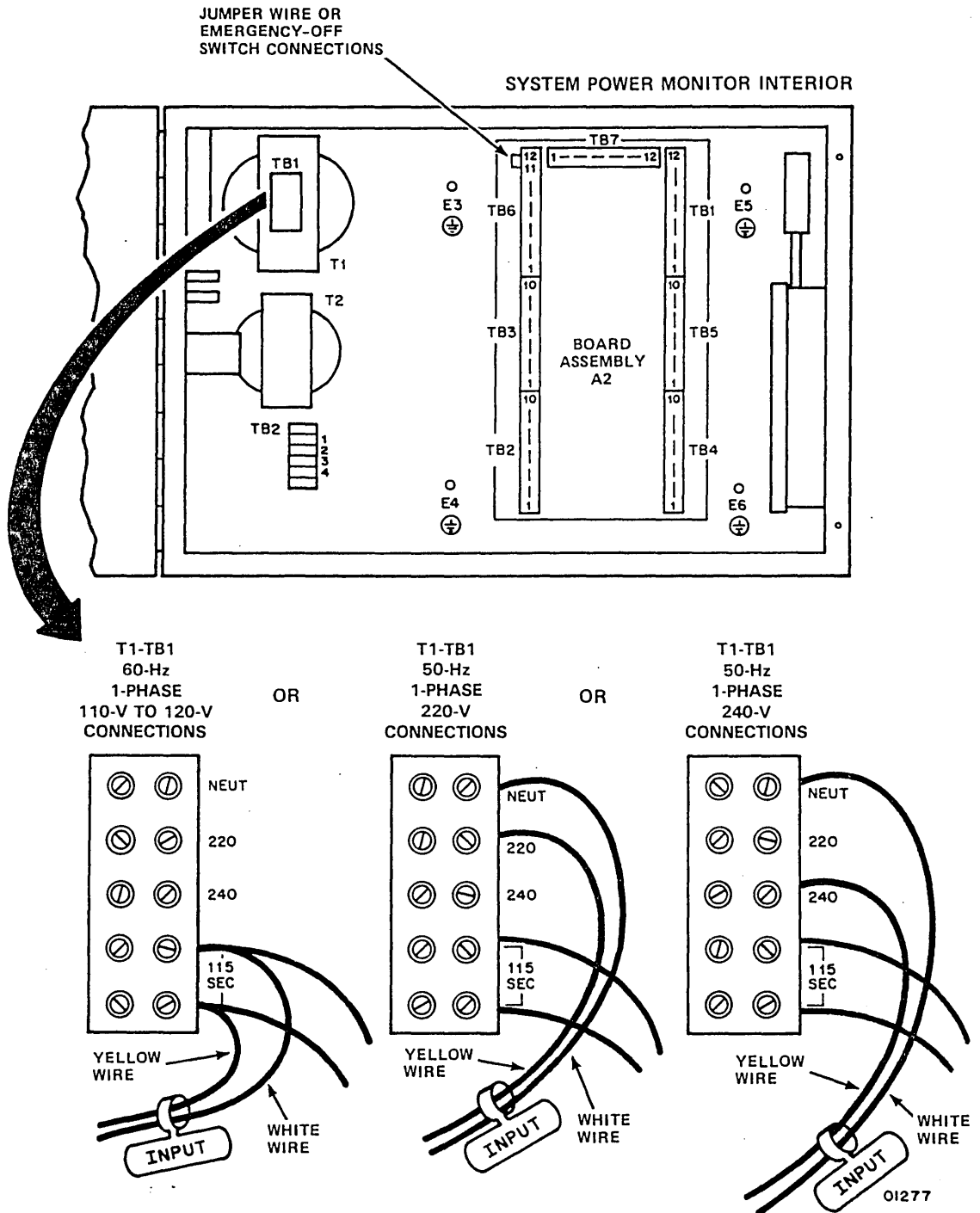


Figure 2-5. SPM Transformer T1 Connections

CHECKING SPM PREOPERATING CONDITIONS (Sheet 4 of 9)

NOTE

The SPM has three EPROM mounting locations (figure 2-6). Location 1XU71 is unused. Location 1XU72 requires an EPROM programmed for central computer models 840, 850, and 860.

- ___ 9. Verify correct EPROM on SPM control board by observing that EPROM at location 1XU72 has PN 22109583. If location does not contain an EPROM or contains the wrong EPROM, install correct one as follows:

CAUTION

To protect an EPROM during its removal and/or replacement on the SPM control board, the installer must wear an antistatic wrist strap that connects to ground.

- ___ a. Connect an antistatic wrist strap to wrist and to frame ground.
- ___ b. Remove EPROM, if wrong EPROM is in socket, by prying it loose from top with small screwdriver.
- ___ c. Align pins of correct EPROM with socket, making sure to match notched end of EPROM with notch at bottom of EPROM socket. Press EPROM into socket.
- ___ d. Remove antistatic wrist strap.

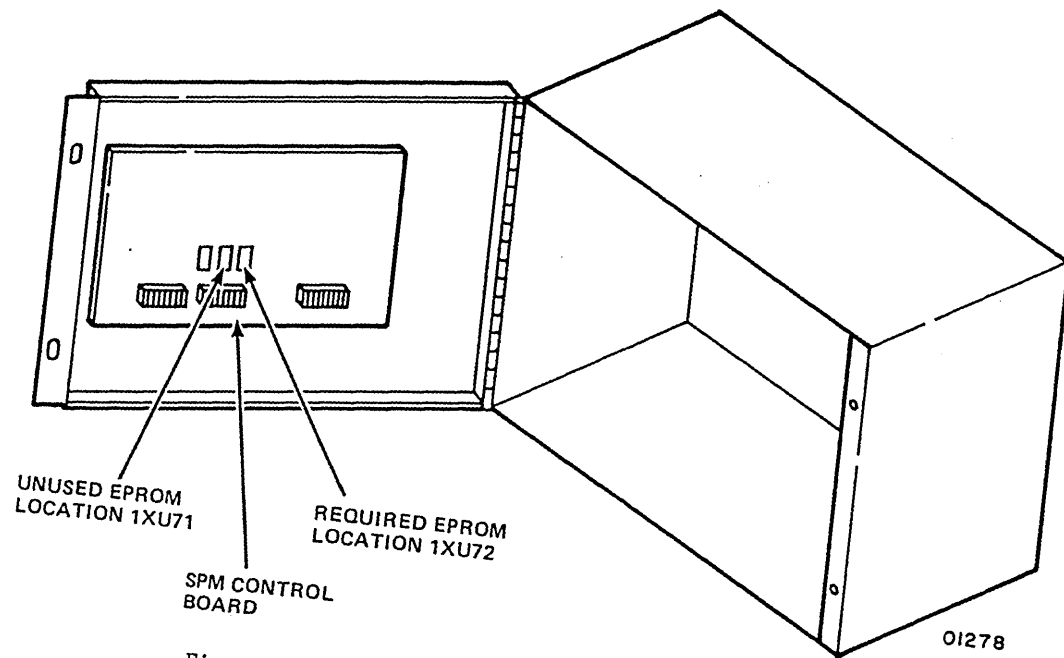


Figure 2-6. EPROM Location on SPM Control Board

CHECKING SPM PREOPERATING CONDITIONS (Sheet 6 of 9)

NOTE

Switches SN3-8 and SN3-9 must be set to ON during this preliminary checkout, and for normal operation.

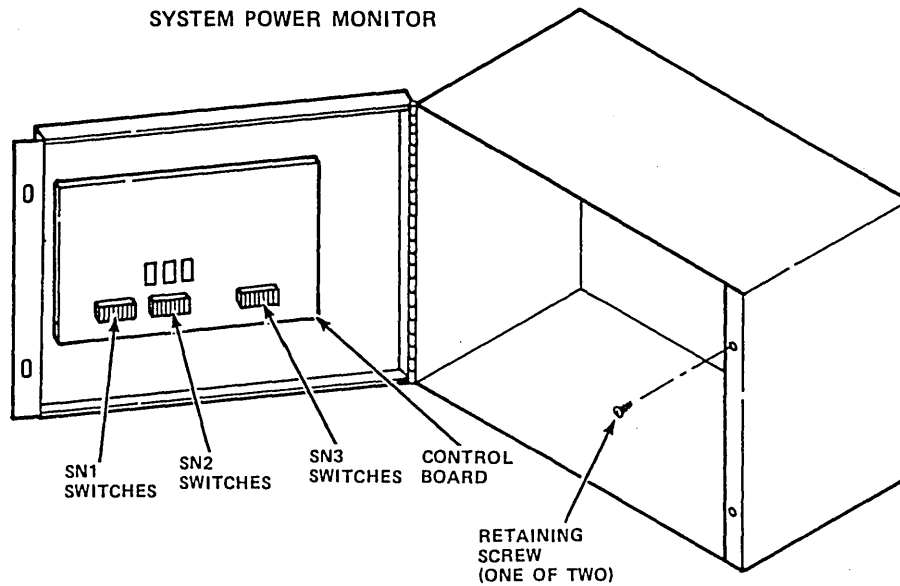
- ___ 10. Set switch groups SN1, SN2, and SN3 on rear of SPM control board (figure 2-7) according to recommended switch settings listed in table 2-3. In some cases, switch settings depend upon site options.
- ___ 11. Record (X) selected SN1, SN2, and SN3 switch settings in charts below for future reference.

Switch Position	SN1 Switch Number							
	1	2	3	4	5	6	7	8
ON								
OFF								

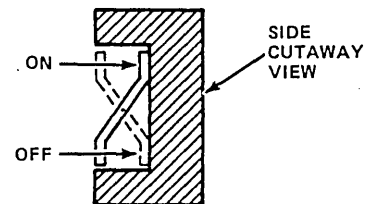
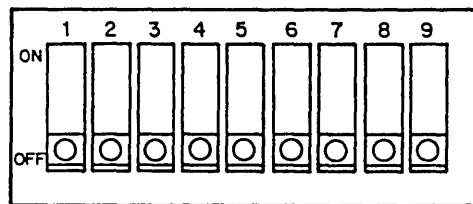
Switch Position	SN2 Switch Number							
	1	2	3	4	5	6	7	8
ON								
OFF								

Switch Position	SN3 Switch Number								
	1	2	3	4	5	6	7	8	9
ON									
OFF									

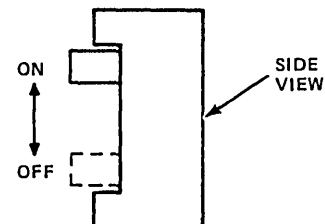
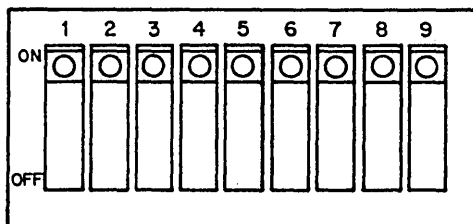
- ___ 12. Do not install SPM panel retaining screws at this time.



SN1, SN2, AND SN3 DETENT SWITCHES



SN1, SN2, AND SN3 SLIDE SWITCHES



NOTES:

1. FRONT VIEWS SHOW SWITCHES SET TO ON. SWITCH POSITIONS VARY, DEPENDING ON SITE CONFIGURATIONS AND OPTIONS.
2. SN1 AND SN2 HAVE ONLY EIGHT SWITCHES. SN3 HAS NINE.
3. SN1, SN2, AND SN3 MAY BE DETENT, SLIDE, OR OTHER SWITCHES.

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Figure 2-7. SPM Switches SN1, SN2, and SN3

CHECKING SPM PREOPERATING CONDITIONS (Sheet 8 of 9)

Table 2-3. SPM Switches SN1, SN2, and SN3 Functions and Settings (Sheet 1 of 2)

Switch	Switch Function	Notes	Recommended Switch Settings
SN1-1	<u>M-G Margins</u> - When set to ON, switch permits SPM to check for any phase of ≤ 96 V or ≥ 144 V.	1,2, 5	Site option.
SN1-2	<u>Room Temperature Margins</u> - When set to ON, switch permits SPM to check for room temperature of ≤ 12.2 °C (54 °F) or ≥ 32.2 °C (90 °F).	1,2, 5	Set to ON if SN3-4 is enabled. SN3-4 is enabled when set to OFF position.
SN1-3	<u>Dew Point Margins</u> - When set to ON, switch permits SPM to check for room dew point of ≤ -17.8 °C (0 °F) or ≥ 13.3 °C (56 °F).	1,2, 5	Set to ON if SN3-3 is enabled. SN3-3 is enabled when set to OFF position.
SN1-4	<u>Relative Humidity Margins</u> - When set to ON, switch permits SPM to check for relative humidity of $\leq 20\%$ or $\geq 70\%$.	1,2, 5	Set to ON if SN3-5 is enabled. SN3-5 is enabled when set to OFF position.
SN1-5	<u>Chassis Voltage Margins</u> - When set to ON, switch permits SPM to check for chassis voltage of $\leq 90\%$ or $\geq 110\%$.	1,2, 5	Set to ON.
SN1-6	<u>Water Cooling Unit Water Margins</u> - When set to ON, switch permits SPM to check for water cooling unit water temperature of ≤ 0.0 °C (-32 °F) or ≥ 26.7 °C (80 °F).	1,2, 5	Set to ON.
SN1-7	<u>Remote Warning</u> - When set to ON, switch permits a remote alarm if power is OFF in any of the monitored columns.	3	Site option.
SN1-8	<u>Remote Off</u> - When set to ON, switch permits a remote alarm for all long and short warnings.	3	Site option.
SN2-1 SN2-2 SN2-3 SN2-4	Selects M-G set 1. Selects M-G set 2. Selects M-G set 3. Selects M-G set 4.		Switch setting is determined by site configuration. Selection of M-G set 1 or 2 is required. ON position enables and OFF disables selection. Unused M-G switches may be left in ON position.
SN2-5 SN2-6 SN2-7	Selects water cooling unit 1. Selects water cooling unit 2. Selects water cooling unit 3.		Switch setting is determined by site configuration. Only water cooling unit 1 or 2 may be selected for CP. ON position enables and OFF disables selection. Unused water cooling unit switches may be left in ON position.

CHECKING SPM PREOPERATING CONDITIONS (Sheet 9 of 9)

Table 2-3. SPM Switches SN1, SN2, and SN3 Functions and Settings (Sheet 2 of 2)

Switch	Switch Function	Notes	Recommended Switch Settings
SN2-8	<u>Fault Latch</u> - When set to ON, switch permits SPM to latch fault indicator lights on SPM until HORN DISABLE switch is pressed. When set to OFF, faults are memory latched and are displayed when switch is set to ON. Pressing HORN DISABLE switch removes memory latch.		Set to OFF. Use ON position only during a fault isolation process. In ON position, random faults are displayed during powerup, and HORN DISABLE switch must be pushed to clear display.
SN3-1	<u>External Warning</u> - When set to OFF, switch enables an environmental warning from an external sensor.	1,2, 3,5	Site option. Temperature, dewpoint, and R/H indicators light for external warning. (Contact is closed on warning.)
SN3-2	<u>External Fault</u> - When set to OFF, switch enables an environmental fault from an external sensor.	1,2, 3,4 6	Site option. Temperature, dewpoint, and R/H indicators light for external warning. (Contact is closed on warning.)
SN3-3	<u>Dew Point Fault</u> - When set to OFF, switch enables SPM to check for room dew point of ≥ 14.5 °C (58 °F).	1,2, 3,4, 6	Set to ON for systems with dewpoint protection, e.g., water cooling units. Set to OFF for systems without dewpoint protection, e.g., refrigeration units.
SN3-4	<u>Room Temperature Fault</u> - When set to OFF, switch enables SPM to check for room temperature of ≥ 40 °C (104 °F).	1,2, 3,4 6	Set to OFF for protection of peripherals.
SN3-5	<u>Relative Humidity Fault</u> - When set to OFF, switch enables SPM to check for room relative humidity of $\geq 96\%$.	1,2, 3,4 6	Site option.
SN3-6	<u>Program Power Off</u> - When set to ON, switch enables power-off function for switches SN3-2, 3, 4, and 5.	4	Set to ON if switches SN3-2, 3, 4, or 5 are set to OFF. Switch may be set to OFF to isolate initial power-on problems caused by environmental faults. Return to OFF after isolating problems.
SN3-7	<u>Meter Disable</u> - When set to ON, switch enables digital display.		Set to ON to permit reading of digital display on SPM front panel. Use OFF position for test purposes only.
SN3-8	180 Remote On.		Set to ON when equipment does not connect to J5 and J6 on bottom of SPM.
SN3-9	180 Remote Short Warning.		Set to OFF when equipment does connect to J5 and J6. OFF enables, ON disables.
Notes (SPM Functions):			
1. Warning light 3. Remote alarm 5. Long warning			
2. Local horn 4. System power off, in- 6. Short warning			
cludes powerdown of MG			

CHECKING SPM OPERATION WITH M-G SET (Sheet 1 of 3)

Use this procedure to ensure the ability of the system power monitor (SPM) to operate and remotely control the system M-G set(s).

Procedure prerequisites:

- The procedures listed in Checking SPM Preoperating Conditions are complete.
- The M-G set has been installed and operated in the local mode. It is now shut off and is set for operation in remote mode.

Procedure:

- ___ 1. Apply 50/60-Hz power to SPM as follows:
 - ___ a. Set keyswitch on left side of SPM to LOCAL (figure 2-8).
 - ___ b. Set wall-mounted circuit breaker that controls 50/60-Hz power to SPM to ON.
 - ___ c. Set wall-mounted circuit breaker that controls 400-Hz power to SPM to ON.
 - ___ d. Set SYSTEM DISCONNECT switch on left side of SPM to ON. Air blows from left air vent, and SYSTEM ON indicator lights on SPM.
- ___ 2. Set switches on front of SPM as follows:
 - ___ a. Set selector switch to MG being used (MG1, MG2, MG3, or MG4).
 - ___ b. Set function switch to MG PHASE 1.
- ___ 3. Press and release LOCAL START switch on front of SPM. ROOM ON, SYSTEM ON, and MG ON indicators on front of SPM light.
- ___ 4. Wait a minimum of 1 min to allow MG to reach and apply its full output voltage. Then observe following digital displays on SPM.
 - ___ a. UNIT display shows MG selected for monitoring (G1, G2, G3, or G4).
 - ___ b. SUB UNIT display shows voltage phase of MG selected for monitoring (1, 2, or 3).
 - ___ c. DATA display shows phase-to-neutral voltage of MG being monitored.
- ___ 5. Check voltages phases as follows:
 - ___ a. Observe a phase 1 voltage of 118 V to 120 V.
 - ___ b. Set display selector switch to MG PHASE 2. Observe voltage of 118 V to 120 V.
 - ___ c. Set display selector switch to MG PHASE 3. Observe voltage of 118 V to 120 V.
 - ___ d. Adjust SPM VOLTAGE ADJUST control (MG1, MG2, MG3 or MG4) for MG being used, if required to obtain correct M-G voltage readings.
- ___ 6. Repeat applicable steps for additional M-G set(s) in system.

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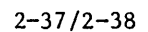


Figure 2-8. System Power Monitor Switches and Display Panel

NOTE:

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Figure 2-8. System Power Monitor Switches and Display Panel

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CHECKING SPM OPERATION WITH M-G SET (Sheet 3 of 3)

IS TERMINATOR POWER SUPPLY PART OF INSTALLATION?

- If yes, continue with step 7.
- If no, go to step 8.

___ 7. Check terminator power supply as follows:

- ___ a. Adjust percentage meter on front of terminator power supply to mechanical zero.
- ___ b. Set wall-mounted 400-Hz circuit breaker for terminator power supply to ON.

WARNING

Dangerous voltages are present at exposed terminals inside the terminator power supply.

- ___ c. Open terminator power supply door.
 - ___ d. Set digital multimeter to measure dc voltages.
 - ___ e. Measure dc voltage across TBI in terminator power supply. All odd-numbered terminals of TBI are positive (+), and all even-numbered terminals are negative (-). If voltmeter does not indicate 20 V from neutral to (+) and from neutral to (-), adjust transformer T1 until it does.
 - ___ f. Observe percentage meter on front of terminator power supply. If meter does not indicate 0 percent, adjust resistor R1 at rear of meter until it does.
 - ___ g. Close terminator power supply door.
 - ___ h. Set wall-mounted 400-Hz circuit breaker for terminator power supply to OFF.
- ___ 8. Press and release STOP switch on front of SPM. This causes removal of power from MG.
- ___ 9. Set to OFF the wall-mounted circuit breaker that controls 50/60-Hz power to SPM.
- ___ 10. Set switches SN3-8 and SN3-9 on rear of SPM door to OFF for normal operation.
- ___ 11. Close SPM panel and install two retaining screws.

PLACING SPM CABLES (Sheet 1 of 2)

Use this procedure to place status and control cables between the system power monitor (SPM) and the central computer and water cooling unit(s). This procedure includes placing the cables under the raised floor, connecting one end to the SPM, and labeling the other end for the connections that take place during the computer installation.

Procedure prerequisites:

- The SPM must be installed within 15 m (50 ft) of all status and control cable connections (including cable drop distance from cabinet to floor) to the central computer and water cooling unit(s).
- Floor cable cutouts for the central computer and water cooling unit(s) must be present or their locations defined.

Parts required:

- One cable, PN 23107064
- Two cables, PN 23141055
- Three cables, PN 53615357
- Cable-tie identifiers or masking tape for labeling cables

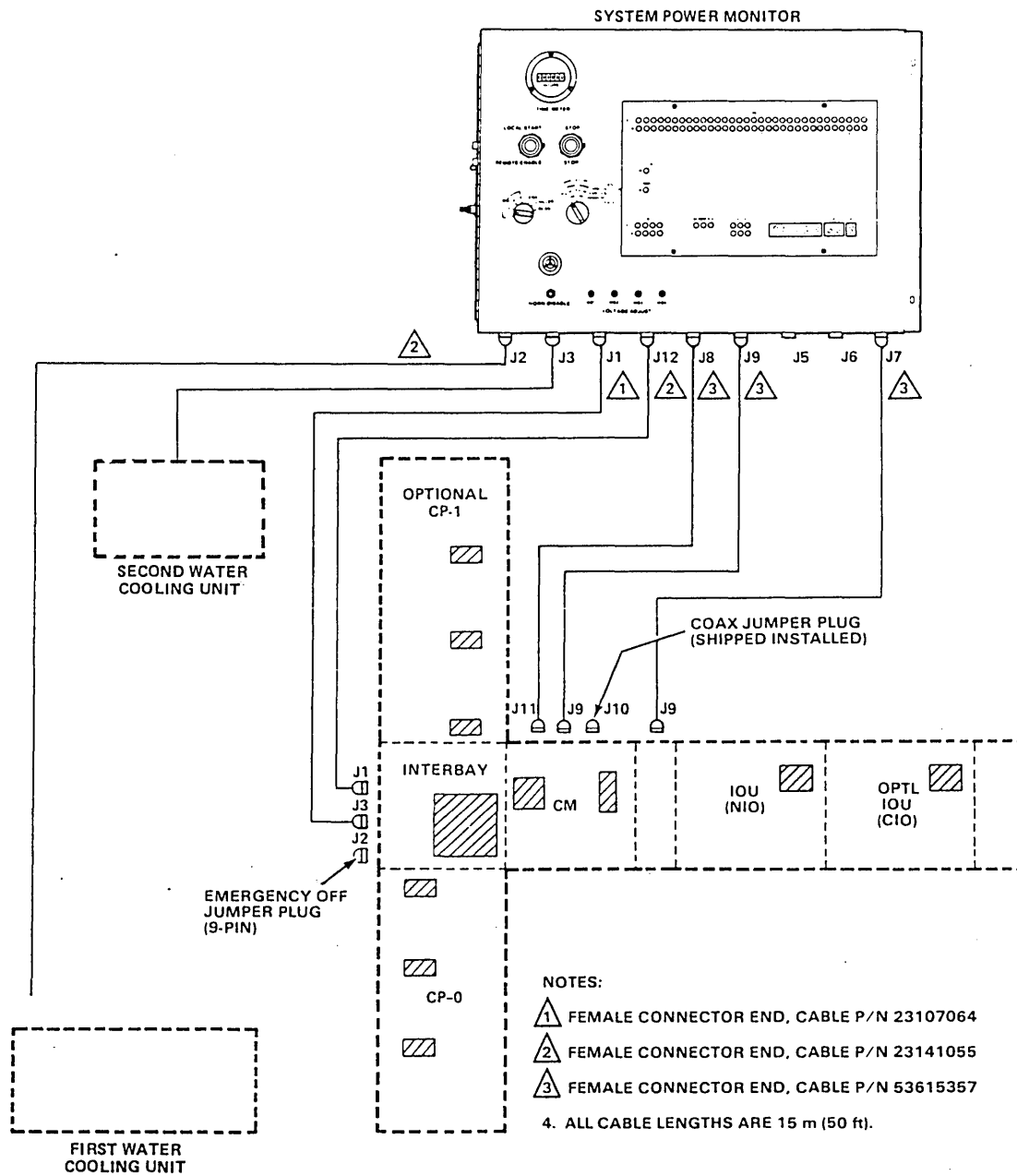
Procedure:

- ___ 1. Remove 9-pin terminator plug from J12 on bottom of SPM. Store this plug in plastic bag inside SPM for later installation on interbay connector J2.
- ___ 2. Identify 15-m (50-ft) warning cables, and connect them to SPM as shown in figure 2-9.
- ___ 3. Label unconnected cable ends with destinations shown in figure.
- ___ 4. Place cables, by groups, under raised floor, and route cable groups to respective floor cutouts as shown in figure.

NOTE

Terminator assembly (PN 24616098) may be shipped with the SPM but is for use with central computer installations other than models 840A, 850A, and 860A.

PLACING SPM CABLES (Sheet 2 of 2)



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Figure 2-9. SPM Cable Placements

Installation of the central computer requires two installers and an electrician who makes wired power connections. The installers and the electrician each use individual sections of this manual to perform tasks shown on an installation and checkout flowchart. This flowchart directs each installer through coordinated installation tasks in a minimal time.

The installer 1 tasks identified on the flowchart and detailed in this section are the following:

- Checking bill of lading
- Uncrating, checking for damage, and verifying shipping lists
- Placing cabinets
- Bolting cabinets
- Connecting channel cables to IOU
- Connecting water hoses
- Connecting power and EMC straps
- Preparing water cooling units
- Applying system power
- Rechecking water flow rates

Tools and parts required for the tasks include the following:

Diagonal cutter or knife

Two Rol-a-lifts

Two cam-action rollers

Two heavy-gauge steel plates

Bolting hardware: 1/4-20 bolts, 1/2-in and 1-in long; 1/4-20 nuts

Two 3/8-in-drive socket wrench sets

Drift pin

Acoustic coupler

Acoustic coupler cable, 15.2 m (50 ft)

Local terminal

Two local terminal cables, 15.2 m (50 ft)

Phillips screwdriver

Distilled water:

37.9 L (10 gal) for each 102-L/min (27-gal/min) water cooling unit or
129 L (34 gal) for optional 220-L/min (58-gal/min) water cooling unit

Funnel

Adjustable wrench

Cobratec corrosion inhibitor

Biocide chemical microorganism control

Water treatment pH indicator kit

Disposable gloves

Safety glasses

Water tank drain hose

Empty water container, 4 to 8 L (1 to 2 gal)

Paper tissues or cloth towel

Differential pressure gauge

1/2-in wrench

Small screwdriver

Digital multimeter

Calibrated temperature probe, model 80T-150F or equivalent

Antistatic smock

CHECKING BILL OF LADING (Sheet 1 of 2)

Use this procedure to verify the bill of lading upon arrival of the central processor equipment at the site.

NOTE

Checking the bill of lading does not necessarily need to be done by installer 1. The installer may elect to delegate it to another person who is a Control Data Engineering Services representative.

The central computer equipment is shipped to the site in individual containers, each marked with its own container number. These container numbers are normally on a bill of lading, which arrives with the equipment and in the possession of the carrier. Table 3-1 is an example of a bill of lading for a dual central processor with options. Because the table is an example, it may vary from an actual shipment and must not be used to verify a complete shipment. Verification of the equipment to the actual bill of lading is necessary immediately upon the delivery of the equipment at the site.

Table 3-1 does not list peripheral equipment. This equipment is normally shipped with the central computer and should also be verified against the bill of lading when the equipment arrives at the computer site.

- ___ 1. Obtain bill of lading and shipping documents from carrier immediately upon arrival of carrier at site.
- ___ 2. Verify shipped containers against those recorded on bill of lading.
- ___ 3. Sign for receipt of shipment only after entire shipment is accounted for and inspected for damage.
- ___ 4. Record time on flowchart for Checking Bill of Lading.

CHECKING BILL OF LADING (Sheet 2 of 2)

Table 3-1. Example of Bill of Lading

Description	Shipping Container Number
AD112-C Central Processor (CP-0) and GH480-A Interbay	1
AD113-A Optional Central Processor (CP-1), applies to model 860A only	2
BS213-A Central Memory (CM) and AT478-A Input/Output Unit (IOU), NIO Cabinet	3
AT481-A Optional IOU, CIO Cabinet	4
GH251-C 102-L/min (27-gal/min) Water Cooling Unit	5
Optional GH251-C 102-L/min (27-gal/min) Water Cooling Unit	6

UNCRATING, CHECKING FOR DAMAGE, AND VERIFYING SHIPPING LISTS (Sheet 1 of 3)

Use this procedure to remove delivered central computer units from their containers. Check each unit for any shipping damage, and verify the presence of all parts by comparing them to the shipping lists that arrive with the units. Table 3-2 is an example of a shipping list. Because the table is only an example, it may vary from the actual shipment and must not be used to verify a complete shipment or to order parts.

NOTE

Perform this procedure with installer 2.

Depending upon the available site space, it may be advantageous to perform the uncrating after the placement of each central computer unit.

Uncrating and placement of the central computer units are interactive procedures. Read and become familiar with both before proceeding.

Tool required:

- Diagonal cutter or knife

Procedure:

1. Follow directions on labels of shipping containers for initial placement of equipment at site.
2. Remove and read any special uncrating instructions and shipping lists attached to outer surfaces of shipping containers.

WARNING

Use caution when cutting shipping bands from containers to prevent the bands from snapping outward and causing personal injury.

CAUTION

It is essential to wear an antistatic smock throughout the installation as a protective measure to prevent damage to microcircuits.

Table 3-2. Shipping List Example

Container Number	Container Contents	Part Number	Quantity
1	Central Processor Cabinet AD112-C and Interbay GH480-A	---	1
2	Central Processor Cabinet AD113-A, applies to model 860A only	---	1
3	Central Memory Cabinet BS213-A and Input/Output Unit AT478-A NIO Cabinet	---	1
4	Optional input/output unit AT481-A NIO cabinet	---	1
5	Water Cooling Unit GH251-C	---	1
6	Optional Water Cooling Unit GH251-C	---	1
7	Miscellaneous items kit	---	1
	Cam	10130148	6
	Manual kit	21989674	1
	Diagnostic kit (CIP)		1
	Special reporting book (QSA)		1
	Bolt 1/4 x 1/2	00860332	6
	Bolt 1/4 x 1	00860336	24
	Bolt 1/4 x 1 1/4	00860337	2
	Bolt 1/4 x 1 1/2	00860338	6
	Nut 1/4	00860104	6
	EMC clips	65864100	10
	Marker - Tie	18874300	24
	Wrist strap	23050903	2
	Wrist strap cable	23050904	2
8	Display Station CC545-F	---	1
9	Display station supplemental kit AU109-A05:	---	1
	Chair	23034600	1
	Coax cable 19.8 m (65 ft)	19191600	2

UNCRATING, CHECKING FOR DAMAGE, AND VERIFYING SHIPPING LISTS (Sheet 3 of 3)

- ___ 3. Open and remove shipping containers. Use a plastic shipping cover from one unit as a refuse container for scrap shipping materials.
- ___ 4. Use a plastic shipping cover from one unit as a refuse container for scrap shipping materials.
- ___ 5. Inspect units for damage.
- ___ 6. Compare contents of containers with shipping lists. Report any missing containers, parts, or damage promptly to carrier and to Control Data.
- ___ 7. Acknowledge a complete shipment by signing carrier's bill of lading.
- ___ 8. Record time on flowchart for uncrating, checking for damage, and verifying shipping lists.

PLACING CABINETS (Sheet 1 of 4)

Use this procedure to place the central computer cabinets and water cooling unit(s) at predesignated floor locations. These floor locations define power and cooling cutouts and the central computer cabinet outline, placed during preinstallation. This procedure provides an order of placing the cabinets for an efficient installation. In some installations, the locations of walls and the spacing of other equipment at the site may require that the installers vary the order of cabinet placement. Bolting the cabinets together occurs after their placement.

NOTE

Perform this procedure with installer 2.

Procedure prerequisites:

- Level floor
- Cutouts in the raised-floor tiles for power and cooling connections
- A floor outline that defines the cabinet placements

Equipment required:

- Two Rol-a-lifts
- Two cam-action rollers, required only for placement of optional CP-1 and optional IOU CIO cabinets
- Two heavy-gauge steel plates for use with cam-action rollers, required only for placement of optional CP-1 and optional IOU CIO cabinets

CAUTION

Be careful to insert Rol-a-lifts into cutouts in cabinet frames, not at bottom edges of cabinet end panels. End panels do not require removal when using the Rol-a-lifts.

WARNING

When moving a unit with Rol-a-lifts, use care to prevent wheels from rolling into a floor cutout. When it is necessary to move a Rol-a-lift-over a floor cutout, temporarily replace the cutout tile(s) with uncut tile(s).

PLACING CABINETS (Sheet 2 of 4)

Procedure:

- ___ 1. Place CM and IOU (NIO) cabinets (figure 3-1), using two Rol-a-lifts with padding between Rol-a-lifts and cabinet to protect cabinet.
- ___ 2. Place CP-0 and interbay cabinet, using two Rol-a-lifts.
- ___ 3. Remove interbay braces. Store braces for future use in moving cabinets.

IS OPTIONAL CP-1 PART OF INSTALLATION?

- If yes, go to step 4.
- If no, go to next question.

- ___ 4. Place optional CP-1 as follows:
 - ___ a. Use two Rol-a-lifts to move CP-1 close to and in alignment with interbay cabinet.
 - ___ b. Remove Rol-a-lift between CP-1 and interbay cabinets.
 - ___ c. Install a cam-action roller on each side of CP-1 cabinet (figure 3-1). Place a heavy-gauge steel plate under each roller to protect floor.
 - ___ d. Move CP-1 cabinet next to interbay cabinet with one installer operating each cam-action roller and one on the Rol-a-lift.

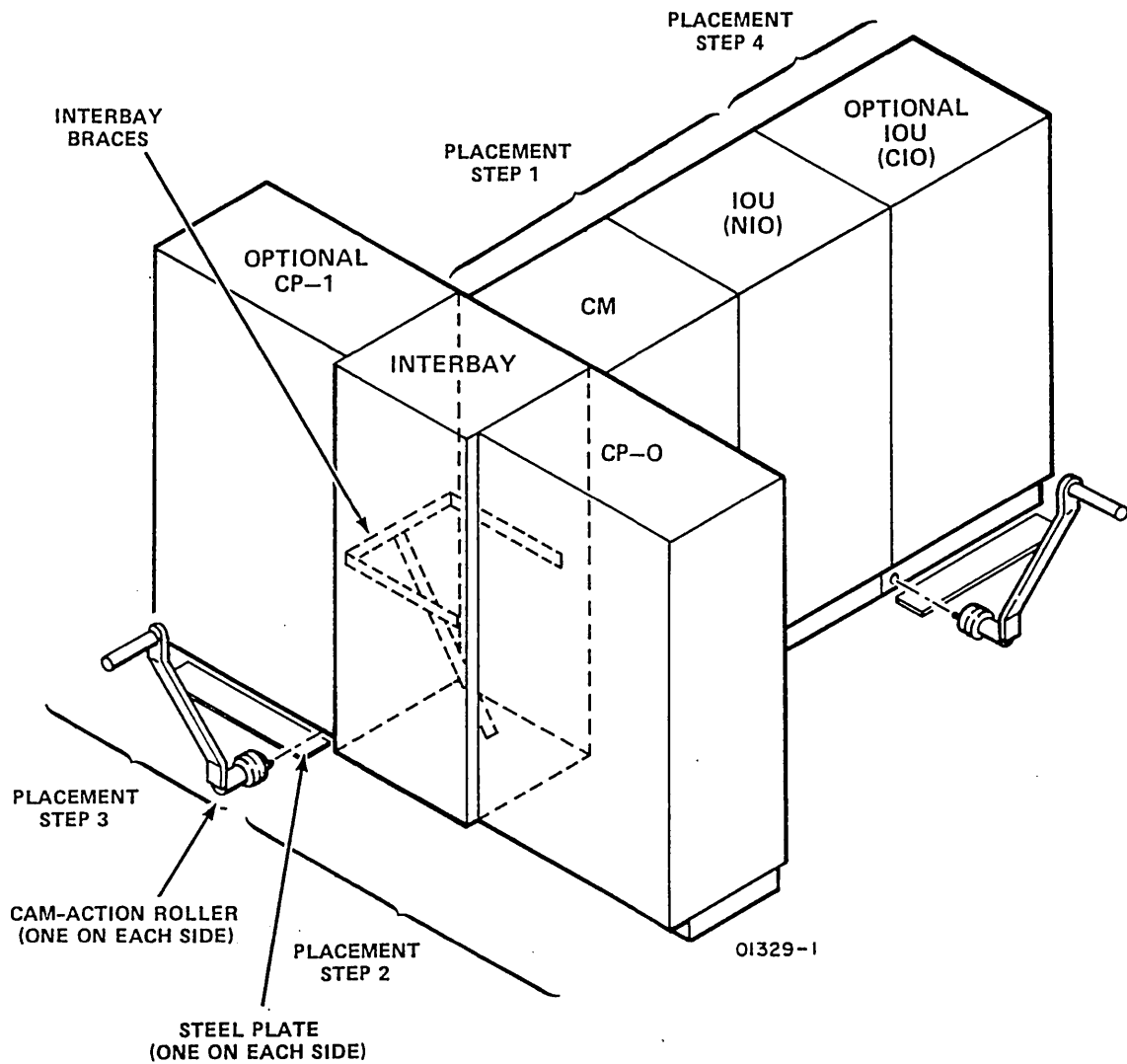


Figure 3-1. Cabinet Placements

PLACING CABINETS (Sheet 4 of 4)

IS IOU CIO CABINET PART OF INSTALLATION?

- If yes, go to step 5.
- If no, go to step 6.

___ 5. Place IOU CIO cabinet as follows:

- ___ a. Use two Rol-a-lifts to move IOU CIO cabinet close to and in alignment with IOU NIO cabinet.
- ___ b. Remove Rol-a-lift between NIO and CIO cabinets.
- ___ c. Install a cam-action roller on each side of CIO cabinet. Place a heavy-gauge steel plate under each roller to protect floor.
- ___ d. Move CIO cabinet next to NIO cabinet with one installer operating each cam-action roller and one on the Rol-a-lift.

___ 6. Remove each of the central computer doors as follows:

- ___ a. Open door and lift it upward.

WARNING

To prevent bending of the top door hinge pin, do not tilt the door more than necessary during its removal.

- ___ b. Tilt bottom of door slightly to one side, just enough to clear bottom hinge pin.

- ___ c. Lower door off of top hinge pin.

___ 7. Place each water cooling unit at its designated location, using two Rol-a-lifts.

___ 8. Remove any wood bracing, installed for shipping purposes, from inside water cooling unit(s).

___ 9. Record time on flowchart for placing cabinets.

BOLTING CABINETS (Sheet 1 of 4)

Use this procedure to bolt individual cabinets of the central computer together.

NOTE

Perform this procedure with installer 2.

Procedure prerequisite:

- All central computer cabinets are in place and in alignment with the floor outline and with each other.

Equipment and parts required:

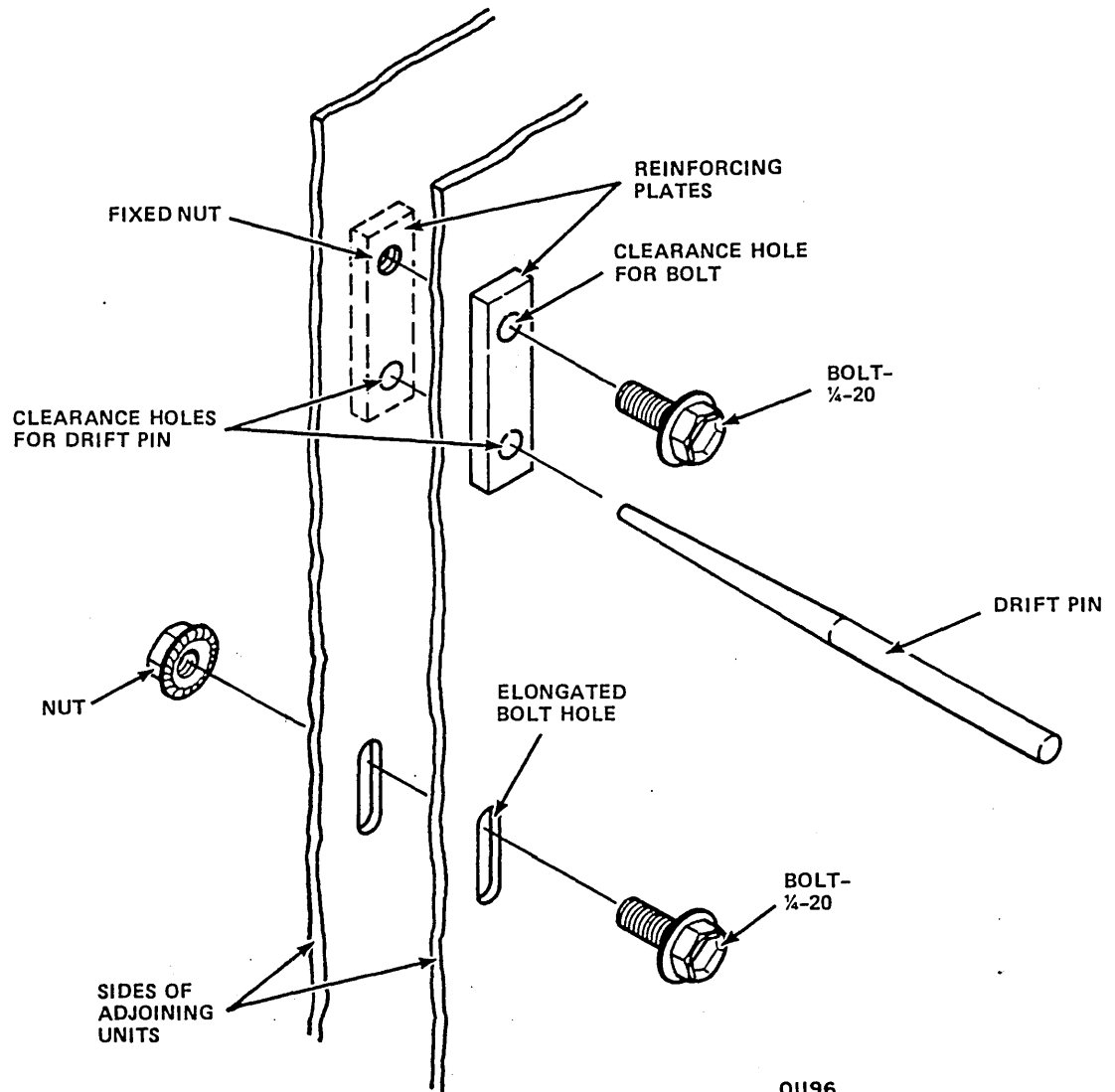
- Bolting hardware: 1/4-20 bolts, 1/2 in and 1 in long; 1/4-20 nuts (shipped with cabinets)
- Two 3/8-in-drive socket wrench sets, one for each installer
- Drift pin

General procedure:

NOTE

Use the following substeps for bolting any two cabinets together.

- ___ 1. Align bolt holes of two cabinets, using drift pin if necessary (figure 3-2).
- ___ 2. Install bolts in fixed-nut locations first, according to the instructions that follow.



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NOTE:
DRIFT PIN HOLES MAY BE LOCATED BESIDE
RATHER THAN BENEATH THE BOLT HOLES.

Figure 3-2. Cabinet Bolting Methods

BOLTING CABINETS (Sheet 3 of 4)

Procedure:

- ___ 1. Bolt CM cabinet to interbay cabinet at two lower fixed-nut locations and two upper loose-nut locations shown in figure 3-3, bolting step 1.
- ___ a. Install bolts loosely.
- ___ b. Push in any EMC shielding that may have squeezed out from cabinet edges.
- ___ c. Tighten bolts, using socket wrench.

IS IOU CIO CABINET PART OF INSTALLATION?

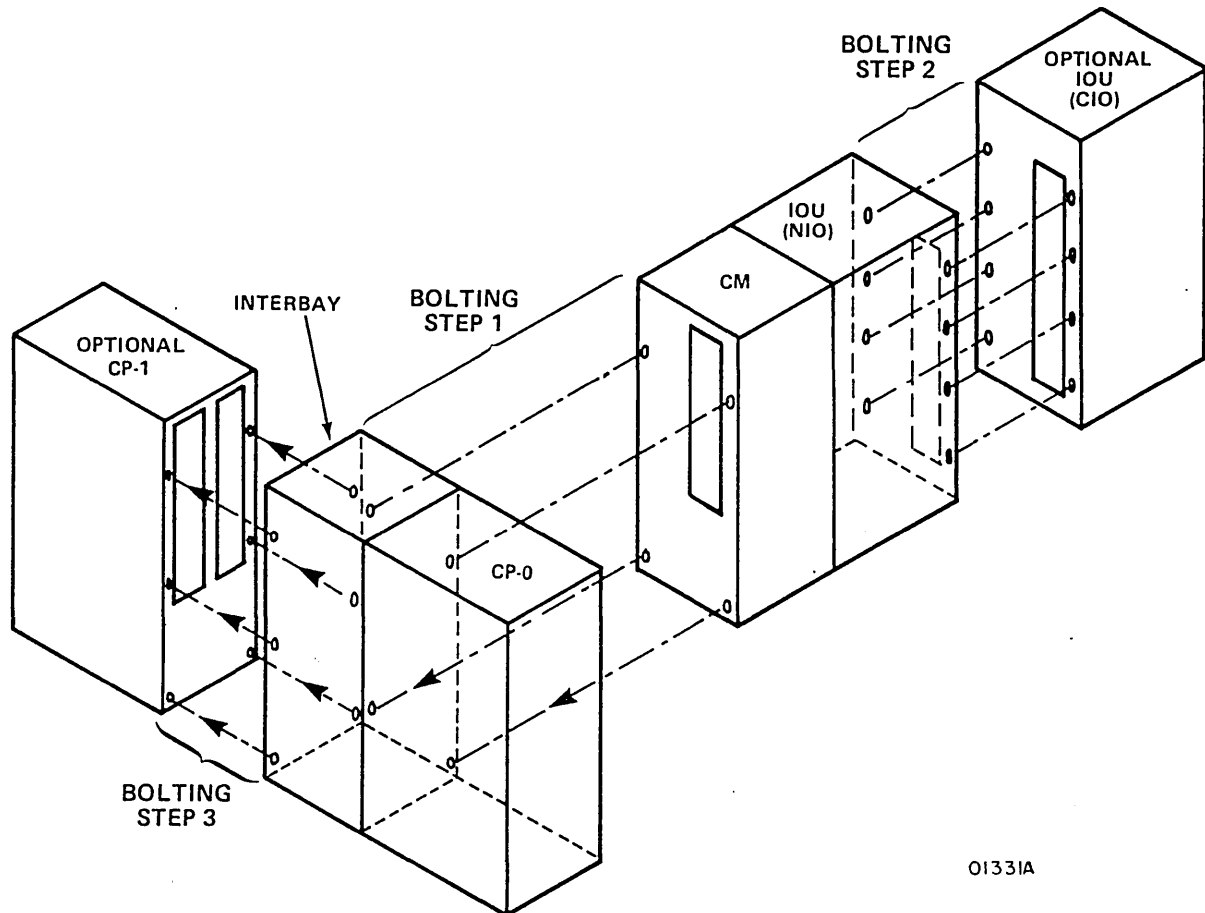
- If yes, go to step 2.
- If no, go to step 5.

- ___ 2. Bolt IOU CIO cabinet to IOU NIO cabinet at eight loose-nut locations shown in figure 3-3, bolting step 2.
- ___ a. Install bolts loosely.
- ___ b. Push in any EMC shielding that may have squeezed out from cabinet edges.
- ___ c. Tighten bolts.

IS OPTIONAL CP-1 PART OF INSTALLATION?

- If yes, go to step 3.
- If no, go to step 4.

- ___ 3. Bolt optional CP-1 cabinet to interbay cabinet at six fixed-nut locations shown in figure 3-3, bolting step 3.
- ___ a. Install bolts loosely.
- ___ b. Push in any EMC shielding that may have squeezed out from cabinet edges.
- ___ c. Tighten bolts.
- ___ 4. Look for gaps between cabinets. If there are any gaps of 6 mm (0.25 in) or more, use additional bolts and nuts in auxiliary holes to draw cabinets together.
- ___ 5. Record time on flowchart for bolting cabinets.



NOTES:

1. CENTER LINES WITH ARROWS (→) SHOW LOCATIONS AND DIRECTIONS OF BOLTS INTO FIXED NUTS.
2. CENTER LINES WITHOUT ARROWS SHOW LOCATIONS OF BOLTS AND NUTS INSTALLED FROM EITHER DIRECTION.
3. USE 1-INCH LENGTH ¼-20 BOLTS FOR STEPS 1 AND 2.
USE ½-INCH LENGTH ¼-20 BOLTS FOR STEP 3.

Figure 3-3. Cabinet Bolt Locations

CONNECTING CHANNEL CABLES TO IOU (Sheet 1 of 7)

Connecting channel cables includes cable connections in the nonconcurrent input/output (NIO) section of the IOU. If the IOU contains the optional concurrent input/output (CIO), the cabling includes connections in the CIO section. These connections are in the following procedures:

- Connect Channel Cables to NIO Cabinet
- Connect Channel Cables to CIO Cabinet

CONNECTING CHANNEL CABLES TO IOU (Sheet 2 of 7)

CONNECT CHANNEL CABLES TO NIO CABINET

Use this procedure to connect cables to the cable connector panel in the nonconcurrent input/output (NIO) cabinet of the IOU and to record the connections for future reference.

Prerequisites:

- Bolting of the central computer cabinets is complete.

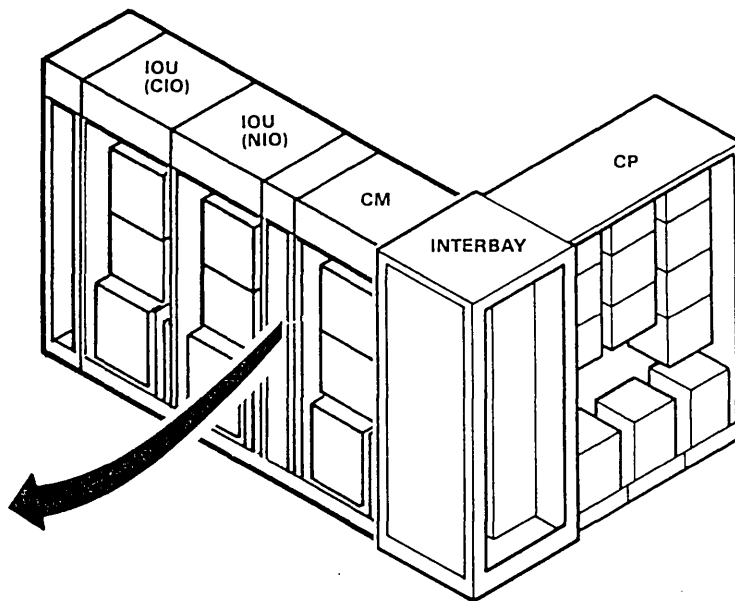
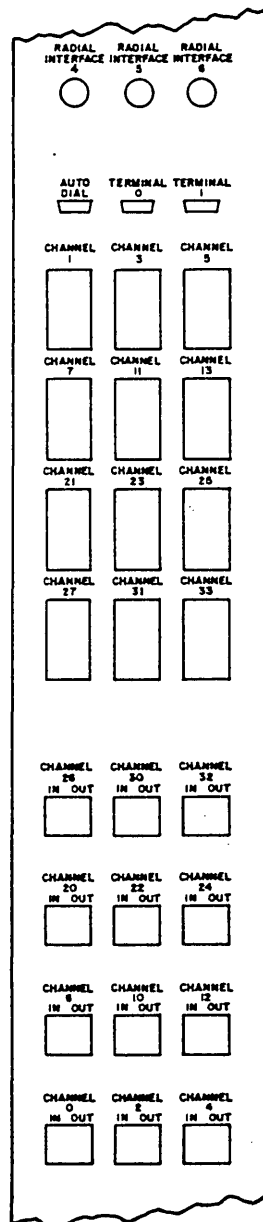
Procedure:

- ___ 1. Pull channel cables up through floor cutout to NIO cabinet cable connector panel (figure 3-4).
- ___ 2. Connect channel cables to NIO cabinet cable connector panel in bottom to top order. This order allows greatest accessibility to cable connectors on panel.
- ___ 3. Record actual channel cable connections in table 3-3 for future reference. Cable connections shown are only suggested.

CONNECTING CHANNEL CABLES TO IOU (Sheet 3 of 7)

CONNECT CHANNEL CABLES TO NIO CABINET (Cont'd)

NIO CHANNEL CABLE
CONNECTOR PANEL



01179A

Figure 3-4. NIO Cable Connector Panel

CONNECTING CHANNEL CABLES TO IOU (Sheet 4 of 7)

CONNECT CHANNEL CABLES TO NIO CABINET (Cont'd)

Table 3-3. NIO Channel Cable Connections

CMI Connector Panel Designators	Peripheral Equipment
Channel 0	Open
Channel 2	Disk Drive 1
Channel 4	Disk Drive 2
Channel 6	Disk Drive 3
Channel 10	Display Station
Channel 12	Unit Record
Channel 20	Communication 1
Channel 22	Communication 2
Channel 24	Communication 3
Channel 26	Open
Channel 30	Open
Channel 32	Magnetic Tape Drive 1
Channel 1	Disk Drive 4
Channel 3	Disk Drive 5
Channel 5	Disk Drive 6
Channel 7	Disk Drive 7
Channel 11	Disk Drive 8
Channel 13	Open
Channel 21	Open
Channel 23	Open
Channel 25	Open
Channel 27	Magnetic Tape Drive 2
Channel 31	Magnetic Tape Drive 3
Channel 33	Magnetic Tape Drive 4

CONNECTING CHANNEL CABLES TO IOU (Sheet 5 of 7)

CONNECT CHANNEL CABLES TO OPTIONAL CIO CABINET

Use this procedure to connect cables to the cable connector panel in the concurrent input/output (CIO) cabinet of the IOU and to record the connections for future reference.

IS IOU CIO CABINET PRESENT?

- If yes continue.
- If no go to next procedure.

Prerequisites:

- Bolting of the central computer cabinets is complete.

Procedure:

- ___ 1. Pull channel cables up through floor cutout to CIO cabinet connector panel (figure 3-5).
- ___ 2. Connect channel cables to CIO cabinet cable connector panel in bottom to top order. This order allows greatest accessibility to cable connectors on panel.
- ___ 3. Record channel cable connections in table 3-4 for future reference.
- ___ 4. Record time on flowchart for Connecting Channel Cables to IOU.

CONNECTING CHANNEL CABLES TO IOU (Sheet 4 of 7)

CONNECT CHANNEL CABLES TO NIO CABINET (Cont'd)

Table 3-3. NIO Channel Cable Connections

CMI Connector Panel Designators	Peripheral Equipment
Channel 0	
Channel 2	
Channel 4	
Channel 6	
Channel 10	
Channel 12	
Channel 20	
Channel 22	
Channel 24	
Channel 26	
Channel 30	
Channel 32	
Channel 1	
Channel 3	
Channel 5	
Channel 7	
Channel 11	
Channel 13	
Channel 21	
Channel 23	
Channel 25	
Channel 27	
Channel 31	
Channel 33	

CONNECTING CHANNEL CABLES TO IOU (Sheet 4 of 7)

CONNECT CHANNEL CABLES TO NIO CABINET (Cont'd)

Table 3-3. NIO Channel Cable Connections

CMI Connector Panel Designators	Peripheral Equipment
Channel 0	
Channel 2	
Channel 4	
Channel 6	
Channel 10	
Channel 12	
Channel 20	
Channel 22	
Channel 24	
Channel 26	
Channel 30	
Channel 32	
Channel 1	
Channel 3	
Channel 5	
Channel 7	
Channel 11	
Channel 13	
Channel 21	
Channel 23	
Channel 25	
Channel 27	
Channel 31	
Channel 33	

CONNECTING CHANNEL CABLES TO IOU (Sheet 4 of 7)

CONNECT CHANNEL CABLES TO NIO CABINET (Cont'd)

Table 3-3. NIO Channel Cable Connections

CMI Connector Panel Designators	Peripheral Equipment
Channel 0	
Channel 2	
Channel 4	
Channel 6	
Channel 10	
Channel 12	
Channel 20	
Channel 22	
Channel 24	
Channel 26	
Channel 30	
Channel 32	
Channel 1	
Channel 3	
Channel 5	
Channel 7	
Channel 11	
Channel 13	
Channel 21	
Channel 23	
Channel 25	
Channel 27	
Channel 31	
Channel 33	

CONNECTING CHANNEL CABLES TO IOU (Sheet 4 of 7)

CONNECT CHANNEL CABLES TO NIO CABINET (Cont'd)

Table 3-3. NIO Channel Cable Connections

CMI Connector Panel Designators	Peripheral Equipment
Channel 0	
Channel 2	
Channel 4	
Channel 6	
Channel 10	
Channel 12	
Channel 20	
Channel 22	
Channel 24	
Channel 26	
Channel 30	
Channel 32	
Channel 1	
Channel 3	
Channel 5	
Channel 7	
Channel 11	
Channel 13	
Channel 21	
Channel 23	
Channel 25	
Channel 27	
Channel 31	
Channel 33	

CONNECT CHANNEL CABLES TO CIO CABINET (Cont'd)

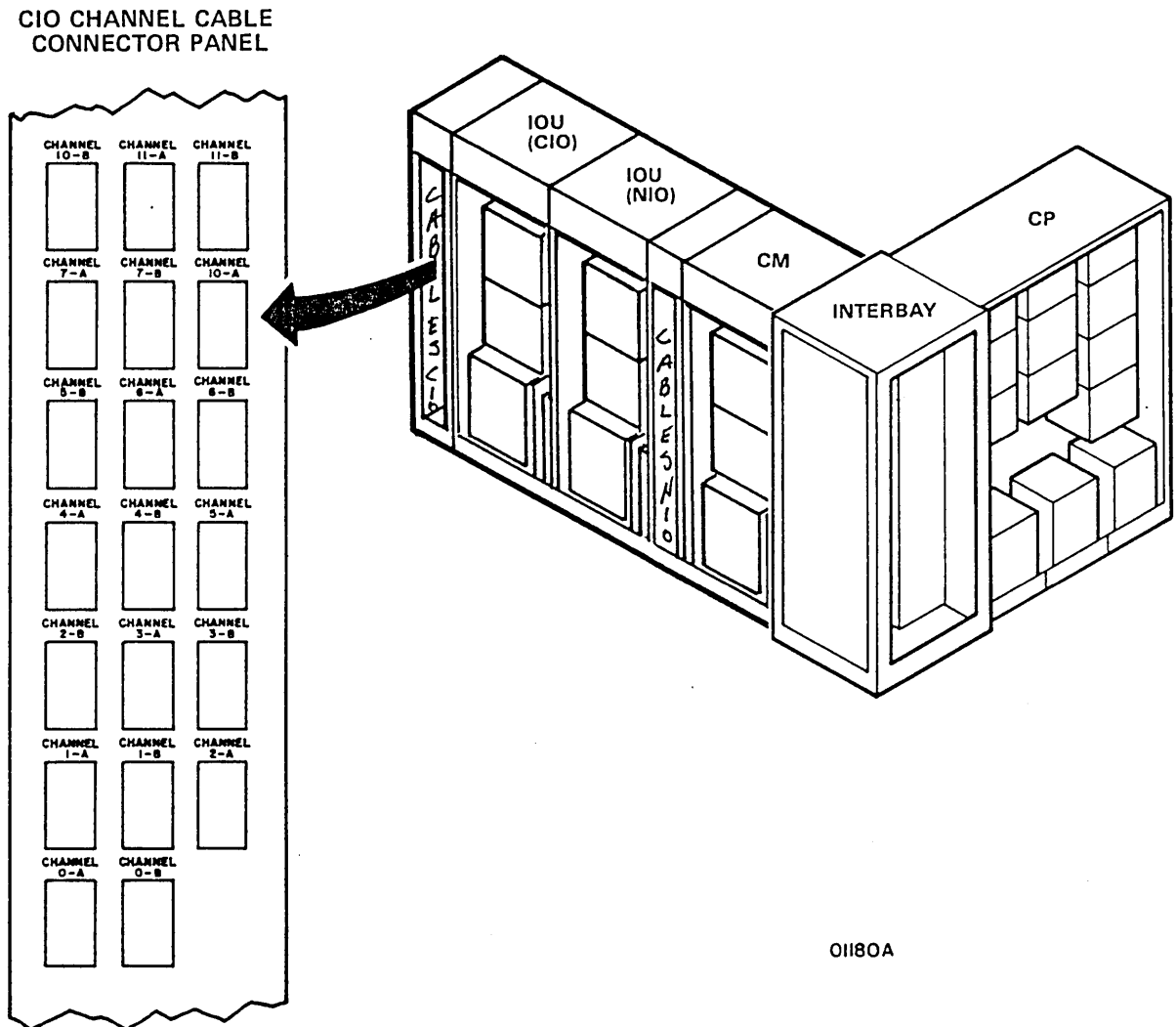


Figure 3-5. CIO Cable Connector Panel

CONNECTING CHANNEL CABLES TO IOU (Sheet 7 of 7)

CONNECT CHANNEL CABLES TO CIO CABINET (Cont'd)

Table 3-4. CIO Channel Cable Connections

DMA Connector Panel Designators	Peripheral Equipment
Channel 0-A	
Channel 0-B	
Channel 1-A	
Channel 1-B	
Channel 2-A	
Channel 2-B	
Channel 3-A	
Channel 3-B	
Channel 4-A	
Channel 4-B	
Channel 5-A	
Channel 5-B	
Channel 6-A	
Channel 6-B	
Channel 7-A	
Channel 7-B	
Channel 10-A	
Channel 10-B	
Channel 11-A	
Channel 11-B	

CONNECTING WATER HOSES (Sheet 1 of 13)

Connecting water hoses consists of completing the connections of preinstalled hoses in either a 102 L/min (27 gal/min) or 220 L/min (58 gal/min) water cooling unit system. Figures 3-6 and 3-7 show these connections which are described in the following tasks:

- Connect water hose assemblies to water cooling unit(s).
- Connect water cooling unit(s) to water manifolds.
- Connect supply and return water hoses to CP.
- Connect supply and return water hoses to CM and IOU.

CONNECTING CHANNEL CABLES TO IOU (Sheet 7 of 7)

CONNECT CHANNEL CABLES TO CIO CABINET (Cont'd)

Table 3-4. CIO Channel Cable Connections

DMA Connector Panel Designators	Peripheral Equipment
Channel 0-A	
Channel 0-B	
Channel 1-A	
Channel 1-B	
Channel 2-A	
Channel 2-B	
Channel 3-A	
Channel 3-B	
Channel 4-A	
Channel 4-B	
Channel 5-A	
Channel 5-B	
Channel 6-A	
Channel 6-B	
Channel 7-A	
Channel 7-B	
Channel 10-A	
Channel 10-B	
Channel 11-A	
Channel 11-B	

CONNECTING CHANNEL CABLES TO IOU (Sheet 7 of 7)

CONNECT CHANNEL CABLES TO CIO CABINET (Cont'd)

Table 3-4. CIO Channel Cable Connections

DMA Connector Panel Designators	Peripheral Equipment
Channel 0-A	
Channel 0-B	
Channel 1-A	
Channel 1-B	
Channel 2-A	
Channel 2-B	
Channel 3-A	
Channel 3-B	
Channel 4-A	
Channel 4-B	
Channel 5-A	
Channel 5-B	
Channel 6-A	
Channel 6-B	
Channel 7-A	
Channel 7-B	
Channel 10-A	
Channel 10-B	
Channel 11-A	
Channel 11-B	

CONNECTING CHANNEL CABLES TO IOU (Sheet 7 of 7)

CONNECT CHANNEL CABLES TO CIO CABINET (Cont'd)

Table 3-4. CIO Channel Cable Connections

DMA Connector Panel Designators	Peripheral Equipment
Channel 0-A	
Channel 0-B	
Channel 1-A	
Channel 1-B	
Channel 2-A	
Channel 2-B	
Channel 3-A	
Channel 3-B	
Channel 4-A	
Channel 4-B	
Channel 5-A	
Channel 5-B	
Channel 6-A	
Channel 6-B	
Channel 7-A	
Channel 7-B	
Channel 10-A	
Channel 10-B	
Channel 11-A	
Channel 11-B	

CONNECTING CHANNEL CABLES TO IOU (Sheet 7 of 7)

CONNECT CHANNEL CABLES TO CIO CABINET (Cont'd)

Table 3-4. CIO Channel Cable Connections

DMA Connector Panel Designators	Peripheral Equipment
Channel 0-A	
Channel 0-B	
Channel 1-A	
Channel 1-B	
Channel 2-A	
Channel 2-B	
Channel 3-A	
Channel 3-B	
Channel 4-A	
Channel 4-B	
Channel 5-A	
Channel 5-B	
Channel 6-A	
Channel 6-B	
Channel 7-A	
Channel 7-B	
Channel 10-A	
Channel 10-B	
Channel 11-A	
Channel 11-B	

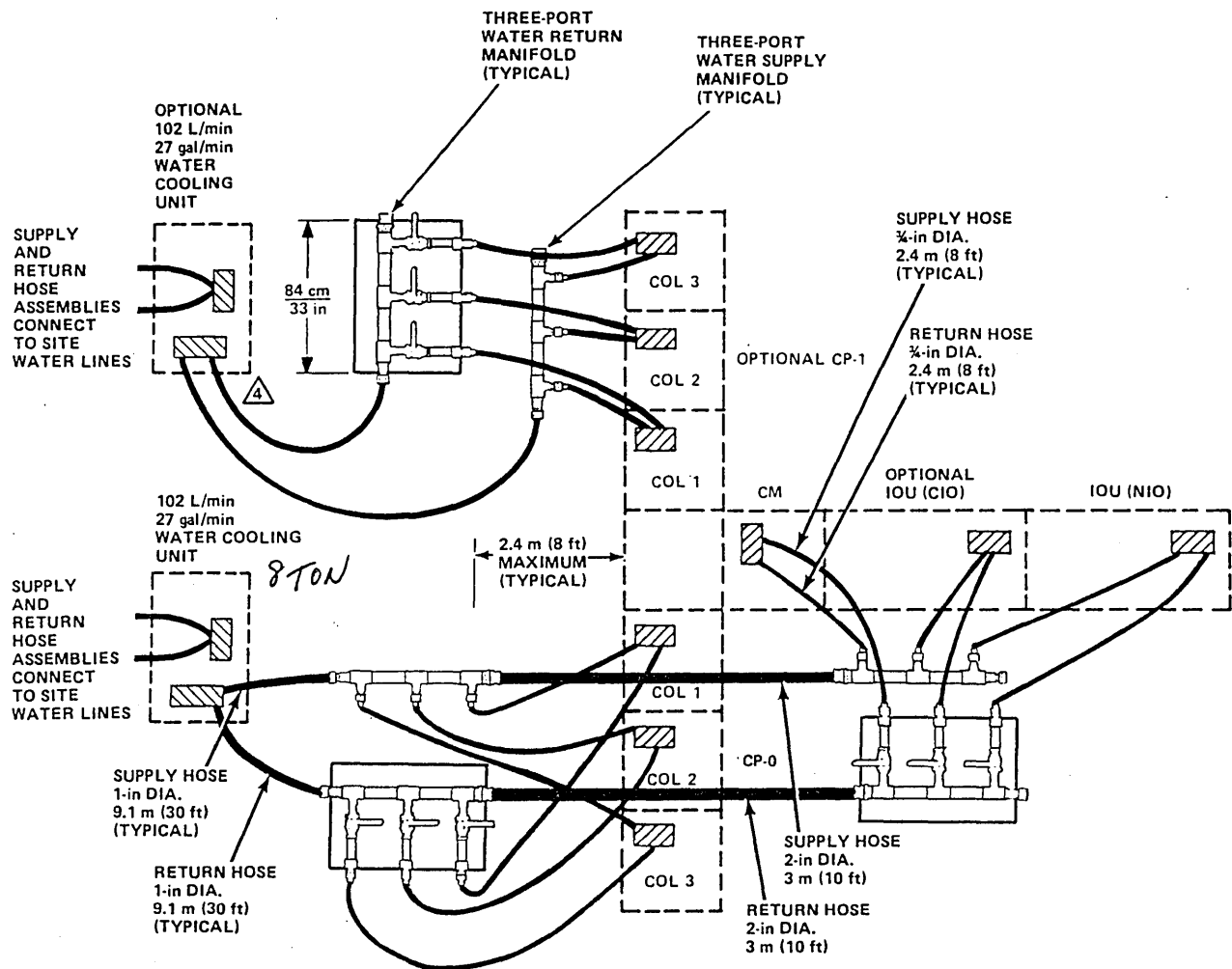
CONNECTING CHANNEL CABLES TO IOU (Sheet 7 of 7)

CONNECT CHANNEL CABLES TO CIO CABINET (Cont'd)

Table 3-4. CIO Channel Cable Connections

DMA Connector Panel Designators	Peripheral Equipment
Channel 0-A	
Channel 0-B	
Channel 1-A	
Channel 1-B	
Channel 2-A	
Channel 2-B	
Channel 3-A	
Channel 3-B	
Channel 4-A	
Channel 4-B	
Channel 5-A	
Channel 5-B	
Channel 6-A	
Channel 6-B	
Channel 7-A	
Channel 7-B	
Channel 10-A	
Channel 10-B	
Channel 11-A	
Channel 11-B	

CONNECTING WATER HOSES (Sheet 2 of 13)



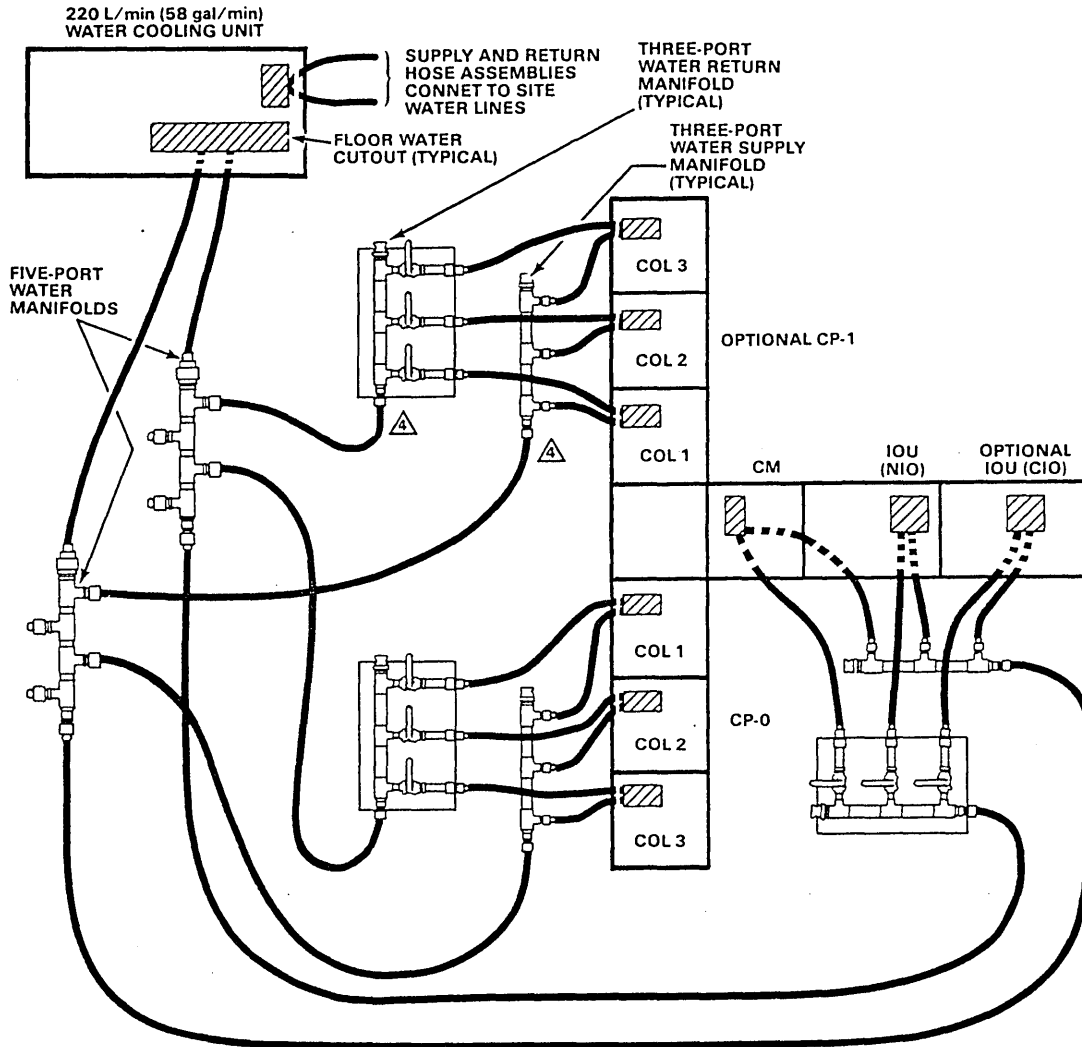
NOTES:

1. BROKEN LINES INDICATE PLANNED EQUIPMENT LOCATIONS.
 2. WATER MANIFOLDS ARE SHOWN SEPARATED FOR CLARITY. IN ACTUAL INSTALLATIONS, THE WATER SUPPLY MANIFOLDS MOUNT DIRECTLY UNDER THE WATER RETURN MANIFOLDS.
 3. LOCATIONS OF WATER MANIFOLDS MAY DIFFER FROM THOSE SHOWN DEPENDING UPON AVAILABLE SPACE UNDER RAISED FLOOR.
- ⚠️ WATER COOLING UNIT, ASSOCIATED WATER MANIFOLDS, AND HOSES ARE REQUIRED ONLY FOR OPTIONAL CP-1.

01319A-1

Figure 3-6. Water Hose Connections in a 102-L/min (27-gal/min) Unit System

CONNECTING WATER HOSES (Sheet 3 of 13)



NOTES:

1. BROKEN LINES INDICATE PLANNED EQUIPMENT LOCATIONS.
2. WATER MANIFOLDS ARE SHOWN SEPARATED FOR CLARITY. IN ACTUAL INSTALLATIONS, THE WATER SUPPLY MANIFOLDS MOUNT DIRECTLY UNDER THE WATER RETURN MANIFOLDS.
3. LOCATIONS OF WATER MANIFOLDS MAY DIFFER FROM THOSE SHOWN DEPENDING UPON AVAILABLE SPACE UNDER RAISED FLOOR.

⚠ WATER MANIFOLD AND ASSOCIATED HOSES ARE REQUIRED ONLY FOR OPTIONAL CP-1.

01319C

Figure 3-7. Water Hose Connections in a 220-L/min (58-gal/min) Unit System

CONNECTING WATER HOSES (Sheet 4 of 13)

CONNECT WATER HOSE ASSEMBLIES TO WATER COOLING UNIT(S)

Use this procedure to connect preinstalled site supply and return water hose assemblies to either the 102-L/min (27-gal/min) or 220-L/min (58-gal/min) water cooling unit. The type of water cooling unit depends upon the central computer options. This procedure must be repeated for each water cooling unit in the central computer installation.

Procedure prerequisite:

- Supply and return water hose assemblies were placed under the raised floor, connected to the site water supply and return valves, and routed to the hose cutouts for the water cooling units during preinstallation.

Procedure:

- ___ 1. Remove floor tiles, as required, and pull site water hose assembly ends up and through water cutout into water cooling unit (figure 3-8).
- ___ 2. Remove dust caps from site supply and return quick couplings on water cooling unit. Store dust caps at site.
- ___ 3. Verify that gaskets are present in quick couplings on ends of site supply and return water hoses.

CAUTIONS

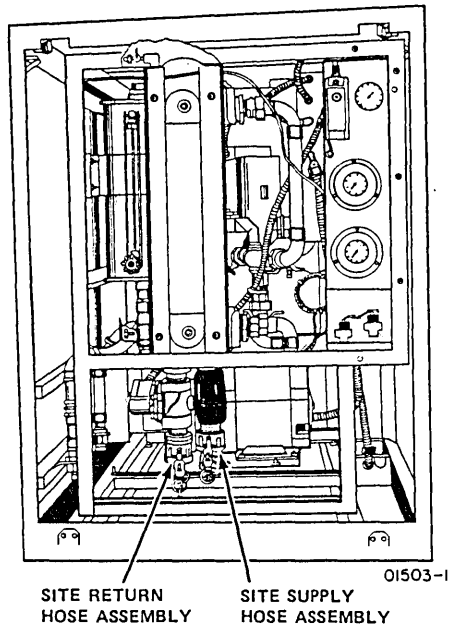
Be sure to connect the supply and return hoses to the corresponding SUPPLY and RETURN connections on the water cooling unit. The water cooling unit does not function properly if these connections are reversed.

After making the hose connections, do not turn water on until instructed to do so. Turning on the water prematurely prevents proper bleeding of air from the site supply and return water lines.

CONNECTING WATER HOSES (Sheet 5 of 13)

CONNECT WATER HOSE ASSEMBLIES TO WATER COOLING UNIT(S) (Cont'd)

102 L/min (27 gal/min) WATER COOLING UNIT



220 L/min (58 gal/min) WATER COOLING UNIT

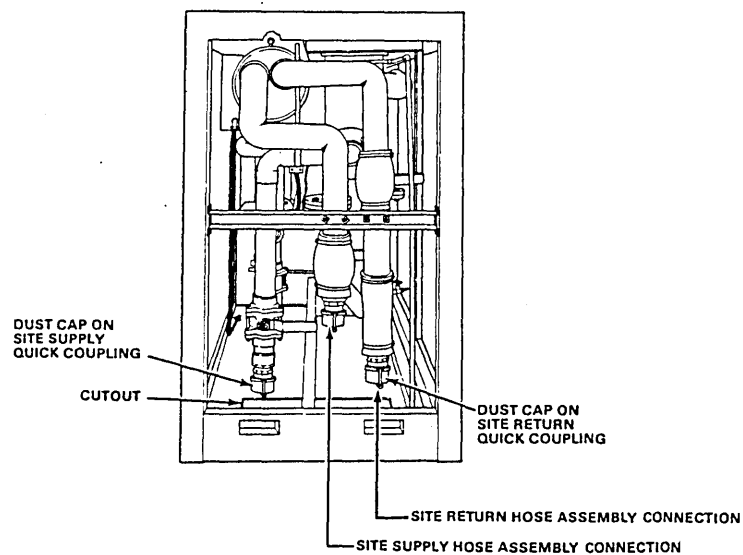


Figure 3-8. Site Water Hose Assembly Connections to Water Cooling Unit(s)

CONNECTING WATER HOSES (Sheet 6 of 13)

CONNECT WATER HOSE ASSEMBLIES TO WATER COOLING UNIT(S) (Cont'd)

- ___ 4. Identify site supply hose assembly by observing assembly that contains a box-enclosed venturi meter connection.
- ___ 5. Connect site supply and return hoses to respective site SUPPLY and RETURN quick couplings on water cooling unit. Close both cam levers on quick couplings.
- ___ 6. Insert wire of a warning tag, supplied with each coupling, through holes in quick coupling cam levers. Twist wire ends tightly together to ensure that levers are not inadvertently opened.

IS SECOND 102-L/min (27-gal/min) WATER COOLING UNIT PART OF INSTALLATION?

- If yes, repeat this procedure for second water cooling unit.
- If no, go to step 7.

- ___ 7. Install floor tiles.

CONNECTING WATER HOSES (Sheet 7 of 13)

CONNECT WATER COOLING UNIT(S) TO WATER MANIFOLDS

Use this procedure to connect preinstalled supply and return hoses on the water supply and return manifolds to the water cooling unit.

This procedure is applicable for either the 102-L/min (27-gal/min) or 220-L/min (58-gal/min) water cooling unit.

Procedure prerequisite:

- The supply and return water hoses that connect the water cooling unit and the water manifolds were placed under the raised floor and connected to the manifolds during preinstallation.

Procedure:

1. Remove floor tiles, as required, to pull manifold supply and return water hose ends up through floor and hose cutouts into water cooling unit (figure 3-9).
2. Remove any dust caps from water cooling unit connections and hose ends. Store dust caps in water cooling unit.
3. Verify that gaskets are present in quick couplings on supply and return hoses. Quick couplings are used only on 220-L/min (58-gal/min) water cooling unit hoses.

CAUTION

Be sure to connect the supply and return hoses to the corresponding SUPPLY and RETURN connections on the water cooling unit. The water cooling unit does not function properly if these connections are reversed.

4. Connect both chassis supply and return hoses to respective SUPPLY and RETURN connections on water cooling unit.

If water cooling unit is a 102-L/min (27-gal/min) unit, its water hose connections have quick disconnects that require pulling back and releasing of hose connector outer shells to connect hoses to water cooling unit.

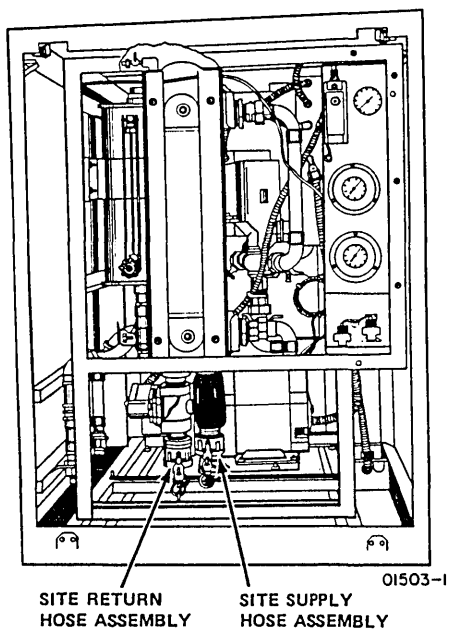
If water cooling unit is a 220-L/min (58-gal/min) unit, its water connections have quick couplings. These require closing of both cam levers and inserting wire of a warning tag, supplied with each coupling, through holes in quick coupling cam levers. Twist wire ends tightly together to ensure that levers do not inadvertently open.

5. Install floor tiles.
6. Repeat this procedure when second 102 L/min (27 gal/min) water cooling unit is part of installation.
7. Record time on flowchart for connecting water hoses.

CONNECTING WATER HOSES (Sheet 8 of 13)

CONNECT WATER COOLING UNIT TO WATER MANIFOLDS (Cont'd)

102 L/min (27 gal/min) WATER COOLING UNIT



220 L/min (58 gal/min) WATER COOLING UNIT

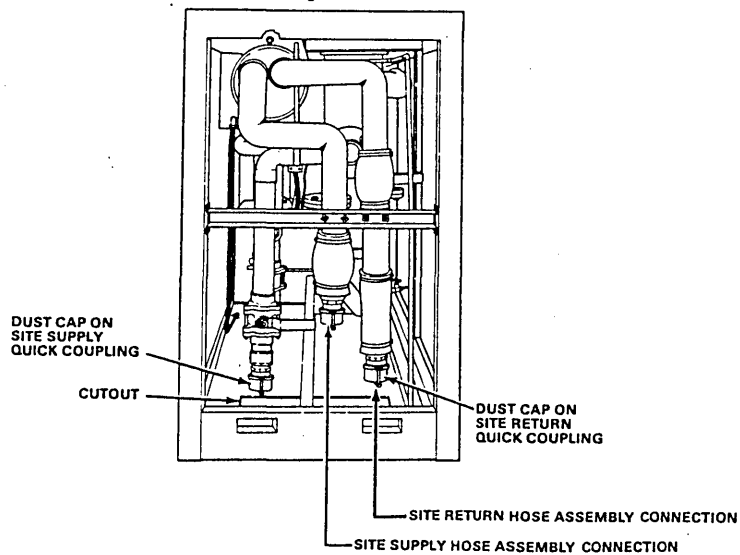


Figure 3-9. Water Manifold Hose Connections to Water Cooling Unit

CONNECTING WATER HOSES (Sheet 9 of 13)

CONNECT SUPPLY AND RETURN WATER HOSES TO CP

Use this procedure to connect supply and return water hoses to the CP-0 and optional CP-1 columns.

Procedure prerequisite:

- Supply and return hoses for the CP columns were connected at one end to the water manifolds, placed under the raised floor, and labeled at the other end during preinstallation.

Procedure:

1. Remove two retaining screws from lower front corners of power distribution box of CP-0 column 1 (figure 3-10).

CAUTION

Pull power supplies slowly outward from columns while checking that attached rear cables are not damaged by being caught or pinched.

2. Slide power distribution box outward from column 3 to access to water supply and return connections.
3. Remove floor tiles along front of CP-0 cabinet to access to hoses from water supply and return manifolds under raised floor.
4. Remove protective plugs from hose ends, if required. Store plugs at site.
5. Pull unconnected hose ends up through floor and cabinet water cutouts to connections in CP-0 column 3. Use care when pulling hoses.

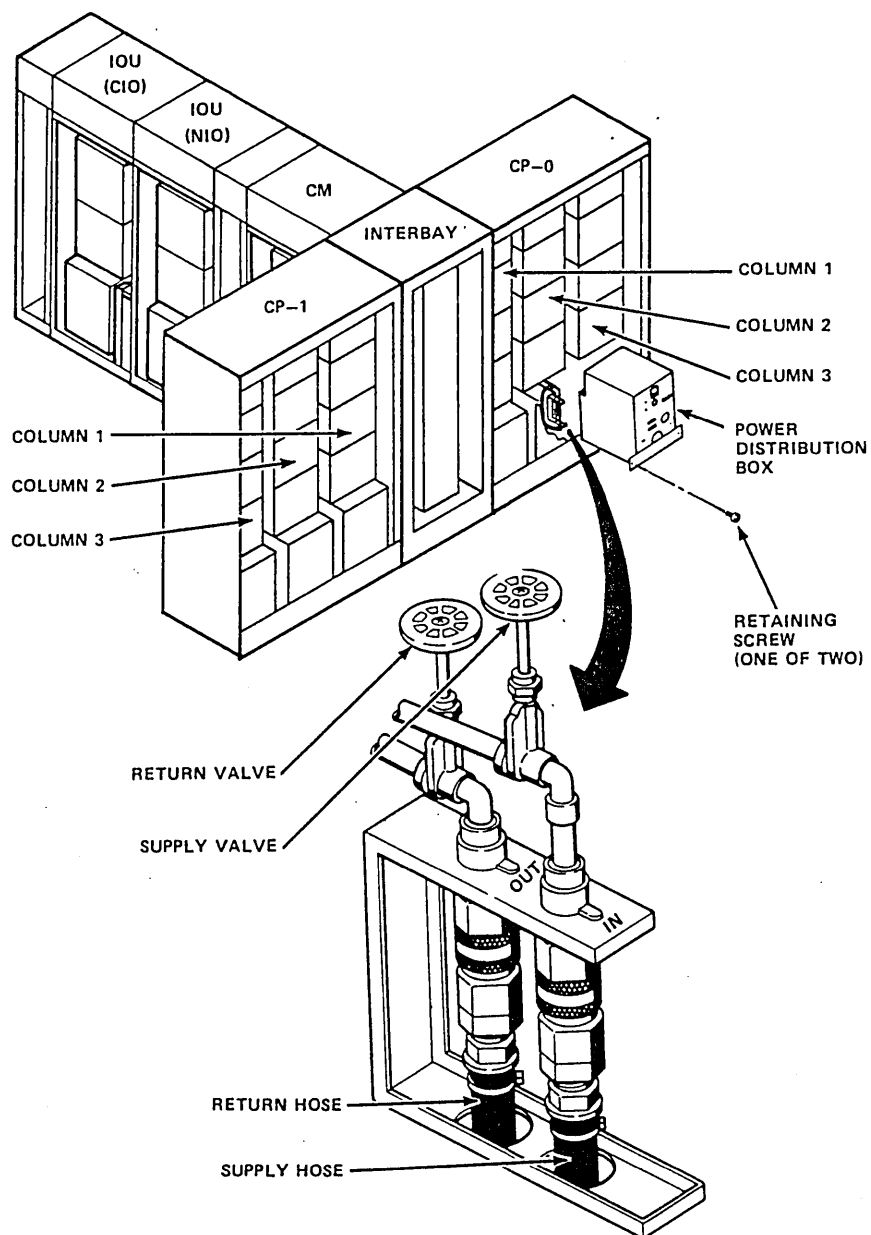
WARNING

Ensure that supply hose quick disconnect connects to the SUPPLY connection in the CP column and that the return hose quick disconnect connects to the RETURN connection in the CP column. The CP column does not cool properly if these connections are reversed.

6. Connect supply and return hoses to supply and return connections in CP-0 column 3.

CONNECTING WATER HOSES (Sheet 10 of 13)

CONNECT SUPPLY AND RETURN WATER HOSES TO CP (Cont'd)



01123-1

Figure 3-10. Supply and Return Water Hose Connections to CP

CONNECTING WATER HOSES (Sheet 11 of 13)

CONNECT SUPPLY AND RETURN WATER HOSES TO CP (Cont'd)

- ___ 7. Slide power distribution box inward. Do not reinstall retaining screws at this time.
- ___ 8. Repeat steps 1 through 7 for CP column 1.
- ___ 9. Repeat steps 1 through 7 for CP column 2.
- ___ 10. Install floor tiles.

IS OPTIONAL CP-1 PART OF INSTALLATION?

- If yes, repeat this procedure for CP-1.
- If no, go to next procedure.

CONNECTING WATER HOSES (Sheet 12 of 13)

CONNECT SUPPLY AND RETURN WATER HOSES TO CM AND IOU

Use this procedure to connect supply and return water hoses to the CM, IOU NIO, and optional IOU CIO cabinets.

Procedure prerequisite:

- Supply and return hoses for the CM cabinet were connected at one end to the water manifolds, placed under the raised floor, and labeled at the other end during preinstallation.

Procedure:

- ___ 1. Remove three retaining screws, lockwashers and cover plate from bottom of CM (figure 3-11).
- ___ 2. Remove retaining screw and lockwasher from lower left corner of hinged power distribution box.
- ___ 3. Open power distribution box to access to water supply and return connections.
- ___ 4. Remove floor tiles, as necessary, in front of CM cabinet.
- ___ 5. Remove protective plugs from hose ends, if required. Store plugs at site.
- ___ 6. Pull unconnected hose ends up through floor and cabinet water cutouts to connections in CM cabinet.

CAUTION

Ensure that the supply hose quick disconnect connects to the SUPPLY connection in the CM cabinet and that the return hose quick disconnect connects to the RETURN connection in the CM cabinet. The CM cabinet does not cool properly if these connections are reversed.

- ___ 7. Connect supply and return hoses to supply and return connections in CM cabinet. Verify that hoses are connected to correct connections.
- ___ 8. Close power distribution box. Do not reinstall retaining screw or cover plate at this time.
- ___ 9. Repeat this procedure for IOU NIO cabinet.

IS OPTIONAL IOU CIO CABINET PART OF INSTALLATION?

- If yes, repeat procedure for that cabinet.
- If no, go to next procedure.

CONNECTING WATER HOSES (Sheet 13 of 13)

CONNECT SUPPLY AND RETURN WATER HOSES TO CM AND IOU (Cont'd)

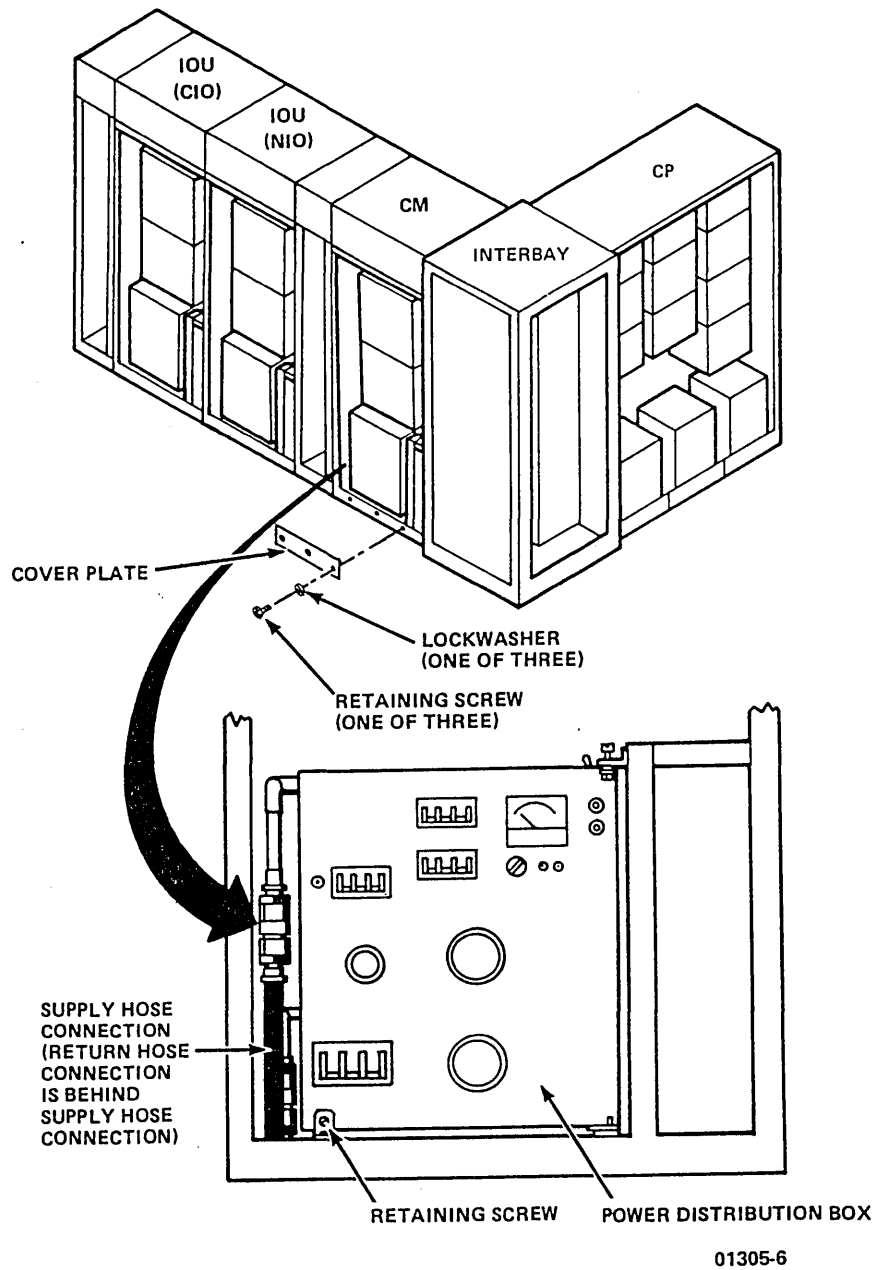


Figure 3-11. Supply and Return Water Hose Connections to CM and IOU

CONNECTING POWER AND EMC STRAPS (Sheet 1 of 14)

The following tasks include power connections and EMC strap connections to the central computer cabinets and water cooling unit(s).

- Connect and verify power cords to interbay power panel.
- Connect power cord from 102-L/min (27-gal/min) unit to power receptacle.
- Connect power cord from 220-L/min (58-gal/min) unit to power receptacle.
- Connect or remove electromagnetic compatibility (EMC) straps.

CONNECTING POWER AND EMC STRAPS (Sheet 2 of 14)

CONNECT AND VERIFY POWER CORDS TO INTERBAY POWER PANEL

Use this procedure to connect and verify the preconnected 50/60-Hz and 400-Hz power cords from the central processor cabinets to the interbay power panel.

Procedure prerequisites:

- 50/60-Hz power to interbay power panel is off.
- 400-Hz power to interbay power panel is off.

Procedure:

- ___ 1. Set 50/60-Hz MAIN DISCONNECT circuit breaker on interbay power panel in interbay to OFF.
- ___ 2. Set 400-Hz MAIN DISCONNECT circuit breaker on power interbay panel in interbay to OFF.
- ___ 3. Set 400-Hz DISCONNECT circuit breaker on each CP, CM, and IOU cabinet power distribution box to OFF.
- ___ 4. Connect CM power cords as follows:
 - ___ a. Route 50/60-Hz and 400-Hz power cords from CM cabinet, through CM and interbay cabinet cutouts, and around left side to front of interbay power panel (figure 3-12).
 - ___ b. Insert 50/60-Hz power cord plug into interbay power panel receptacle J3. Twist plug lightly in a clockwise motion to ensure that it locks into receptacle.
 - ___ c. Insert 400-Hz power cord plug into interbay power panel receptacle J8. Twist plug lightly in a clockwise motion to ensure that it locks into receptacle.
- ___ 5. Connect IOU NIO power cords as follows:
 - ___ a. Route 50/60-Hz and 400-Hz power cords from IOU NIO cabinet, through CM and interbay cabinet cutouts, and around left side to front of interbay power panel.
 - ___ b. Insert 50/60-Hz power cord plug into interbay power panel receptacle J1. Twist plug lightly in a clockwise motion to ensure that it locks into receptacle.
 - ___ c. Insert 400-Hz power cord plug into interbay power panel receptacle J9. Twist plug lightly in a clockwise motion to ensure that it locks into receptacle.

CONNECTING POWER AND EMC STRAPS (Sheet 3 of 14)

CONNECT AND VERIFY POWER CORDS TO INTERBAY POWER PANEL (Cont'd)

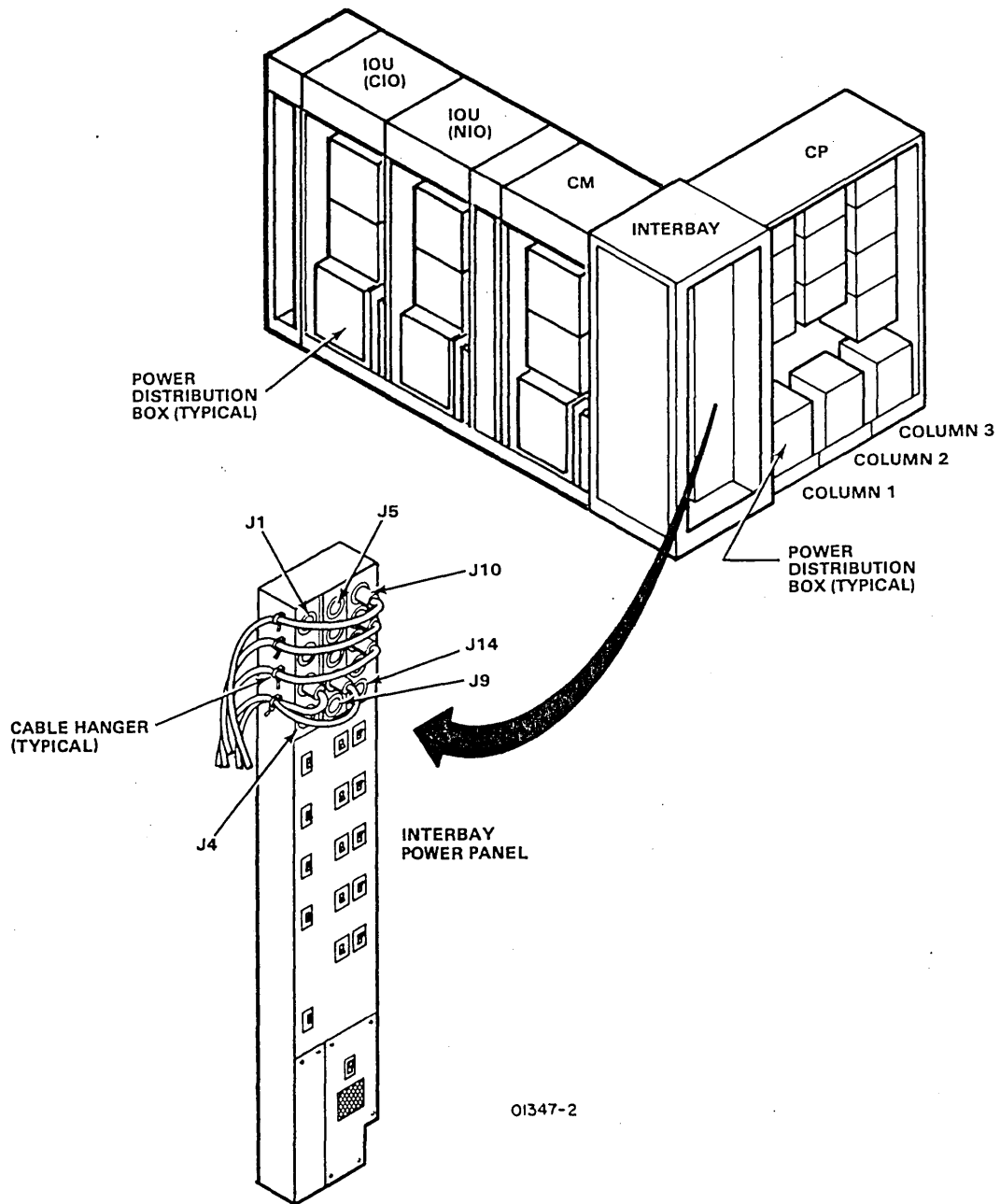


Figure 3-12. 50/60-Hz and 400-Hz Power Cord Connections to Interbay Power Panel

CONNECTING POWER AND EMC STRAPS (Sheet 4 of 14)

CONNECT AND VERIFY POWER CORDS TO INTERBAY POWER PANEL (Cont'd)

- ___ 6. Connect optional IOU CIO power cords as follows:
 - ___ a. Route 50/60-Hz and 400-Hz power cords from IOU CIO cabinet, through IOU NIO, CM, and interbay cabinet cutouts, and around left side to front of interbay power panel.
 - ___ b. Insert 50/60-Hz power cord plug into interbay power panel receptacle J2. Twist plug lightly in a clockwise motion to ensure that it locks into receptacle.
 - ___ c. Insert 400-Hz power cord plug into interbay power panel receptacle J4. Twist plug lightly in a clockwise motion to ensure that it locks into receptacle.
- ___ 7. Verify CP-0 preconnected power cord connections as follows (figure 3-13):
 - ___ a. Column 1 400-Hz power cord is plugged and locked into power panel J10.
 - ___ b. Column 2 power cord is plugged and locked into power panel J11.
 - ___ c. Column 3 power cord is plugged and locked into power panel J12.

IS CP-1 PART OF INSTALLATION?

- If yes, go to step 8.
- If no, go to step 9.

- ___ 8. Connect CP-1 power cords as follows:
 - ___ a. Route column 1 400-Hz power cord to interbay and connect it to J5.
 - ___ b. Route column 2 400-Hz power cord to interbay and connect it to J6.
 - ___ c. Route column 3 400-Hz power cord to interbay and connect it to J7.
- ___ 9. Tie power cords to cable hangers on side of interbay power panel using plastic ties. Ensure that power cords are firmly tied to cable hangers, leaving no excessive slack in front of interbay power panel.

CONNECTING POWER AND EMC STRAPS (Sheet 5 of 14)

CONNECT AND VERIFY POWER CORDS TO INTERBAY POWER PANEL (Cont'd)

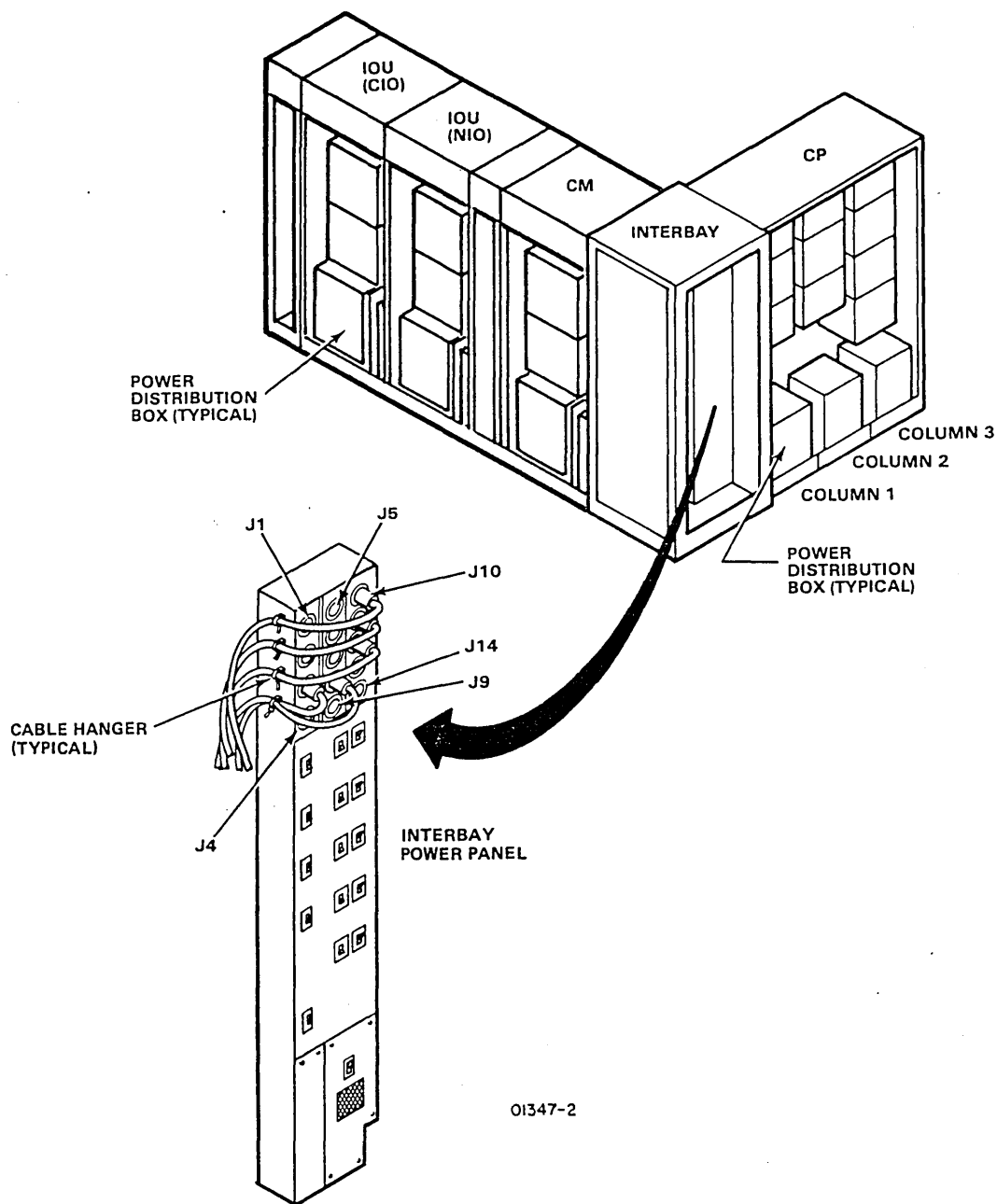


Figure 3-13. 50/60-Hz and 400-Hz Power Cord Connections to Interbay Power Panel

CONNECTING POWER AND EMC STRAPS (Sheet 6 of 14)

CONNECT POWER CORD FROM 102-L/min (27-gal/min) UNIT TO POWER RECEPTACLE

Use this procedure to connect a power cord from the 102-L/min (27-gal/min) water cooling unit to a prewired 50/60-Hz power receptacle under the raised floor or to connect preplaced 50/60-Hz power wiring under the floor directly to the water cooling unit.

IS 102-L/min (27-gal/min) UNIT PART OF INSTALLATION?

- If yes, continue with this procedure.
- If no, go to next procedure.

Part required:

- 50-Hz power cord when site has 50-Hz power.

Procedure:

- ___ 1. Set INPUT POWER DISCONNECT switch on water cooling unit (figure 3-14) to OFF.

NOTE

The power connection to the water cooling unit will either be through a 60-Hz power cord (factory-installed on unit), through a 50-Hz power cord (requires field installation), or through direct 50/60-Hz wiring. Select the following applicable step 2, 3, or 4 to match the site power condition.

- ___ 2. Select following applicable condition and perform associated substeps:

When site has 60-Hz power with prewired power receptacles:

- ___ a. Pull 60-Hz power cord (connected to water cooling unit power distribution box) down through floor cutout.
- ___ b. Connect cord to 60-Hz power receptacle under raised floor.

When site has 50-Hz power with prewired power receptacles:

- ___ a. Remove cover from power input box.
- ___ b. Disconnect and remove factory-installed 60-Hz power cord.
- ___ c. Install 50-Hz power cord.
- ___ d. Connect cord to 50-Hz power receptacle.

CONNECTING POWER AND EMC STRAPS (Sheet 7 of 14)

CONNECT POWER CORD FROM 102-L/min (27-gal/min) UNIT TO POWER RECEPTACLE (Cont'd)

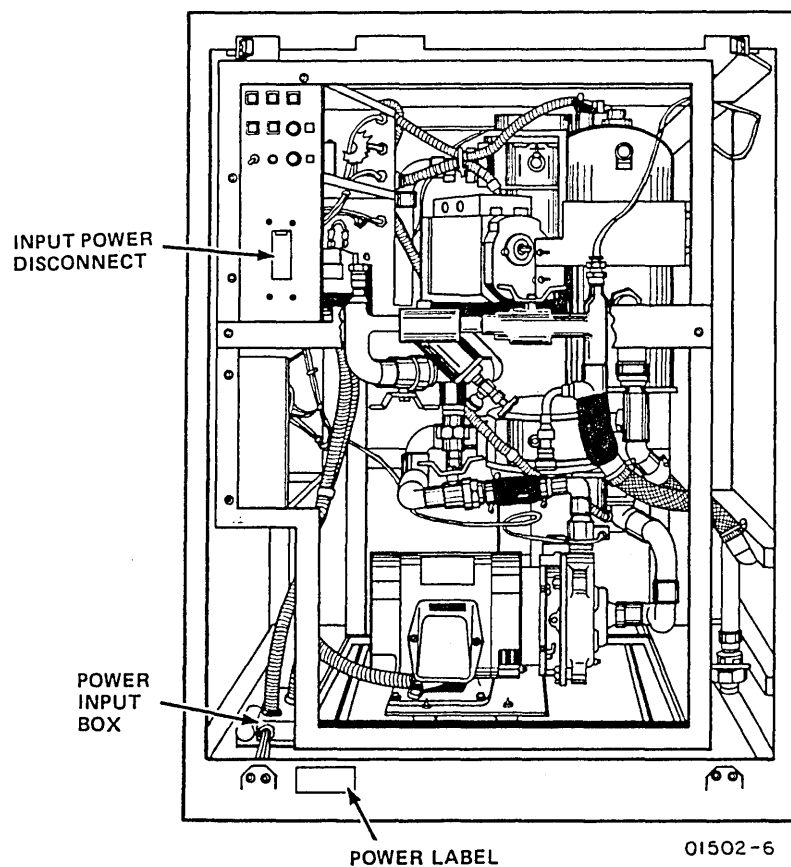


Figure 3-14. Power Connections to 102-L/min (27-gal/min) Unit

CONNECTING POWER AND EMC STRAPS (Sheet 8 of 14)

CONNECT POWER CORD FROM 102-L/min (27-gal/min) UNIT TO POWER RECEPTACLE (Cont'd)

NOTE

All direct power wire connections must be made by a licensed electrician under the supervision of a Control Data customer engineer or computer system engineer. All local codes must be followed.

When site has 50/60-Hz direct wiring:

- ___ a. Remove cover from power distribution box.
- ___ b. Disconnect and remove power cord from power distribution box.
- ___ c. Pull wiring from wall-mounted circuit breaker up through power cutouts and into power distribution box.
- ___ d. Connect wiring from wall-mounted circuit breaker to TBl in power input box as follows:

<u>50/60-Hz</u> <u>Circuit Breaker</u>		<u>Power</u> <u>Distribution Box</u>
Neutral	to	TBl-1
Phase 1	to	TBl-2
Phase 2	to	TBl-3
Phase 3	to	TBl-4

- ___ e. Install power input box cover.

IS SECOND 102-L-min (27-gal/min) WATER COOLING UNIT PART OF INSTALLATION?

- If yes, go to step 3.
- If no, go to next procedure.

- ___ 3. Repeat this procedure for second water cooling unit.

CONNECTING POWER AND EMC STRAPS (Sheet 9 of 14)

CONNECT POWER CORD FROM 220-L/min (58-gal/min) UNIT TO POWER RECEPTACLE

Use this procedure to connect a power cord from the 220-L/min (58-gal/min) water cooling unit to a prewired 50/60-Hz power receptacle under the raised floor or to directly connect preplaced 50/60-Hz power wiring under the floor directly to the water cooling unit.

IS 220-L/min (58-gal/min) UNIT PART OF INSTALLATION?

- If yes, continue with this procedure.
- If no, ensure that power is connected to 102-L/min (27-gal/min) water cooling unit then go to next procedure.

Procedure prerequisites:

- 50/60-Hz power to wall-mounted circuit breaker for water cooling unit is off.
- Preinstallation power inspection is complete, and power wiring is correct.

Part required:

- 50-Hz power cord when site has 50-Hz power.

Procedure:

- ___ 1. Set INPUT POWER DISCONNECT switch on water cooling unit (figure 3-15) to OFF.

NOTE

The power connection to the water cooling unit will either be through a 60-Hz power cord (factory-installed on unit), through a 50-Hz power cord (requires field installation), or through direct 50/60-Hz wiring. Select the following applicable step 2, 3, or 4 to match the connection.

- ___ 2. Select following applicable condition and perform associated substeps:

When site has 60-Hz power with prewired power receptacles:

- ___ a. Pull 60-Hz power cord (connected to water cooling unit power distribution box) down through floor cutout.
- ___ b. Connect cord to 60-Hz power receptacle under raised floor.

CONNECTING POWER AND EMC STRAPS (Sheet 10 of 14)

CONNECT POWER CORD FROM 220-L/min (58-gal/min) UNIT TO POWER RECEPTACLE (Cont'd)

When site has 50-Hz power with prewired power receptacles:

- ___ a. Remove cover from power input box.
- ___ b. Disconnect and remove factory-installed 60-Hz power cord.
- ___ c. Install 50-Hz power cord.
- ___ d. Connect cord to 50-Hz power receptacle.

FRONT VIEW

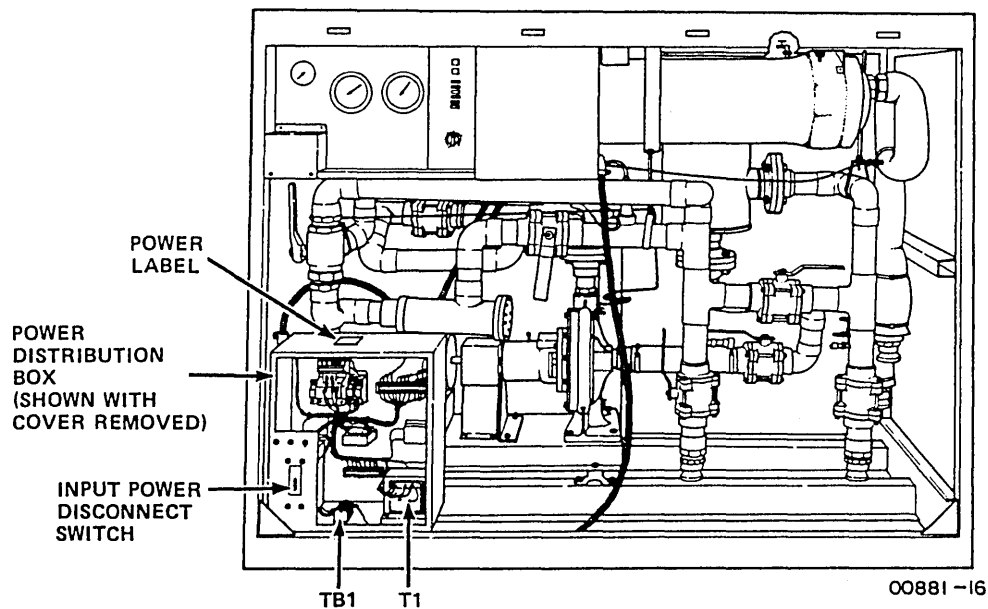


Figure 3-15. Power Connections to 220-L/min (58-gal/min) Unit

CONNECTING POWER AND EMC STRAPS (Sheet 11 of 14)

CONNECT POWER CORD FROM 220-L/min (58-gal/min) UNIT TO POWER RECEPTACLE (Cont'd)

NOTE

All direct power wire connections must be made by a licensed electrician under the supervision of a Control Data customer engineer or computer system engineer. All local codes must be followed.

When site has 50/60-Hz direct wiring:

- ___ a. Remove cover from power distribution box.
- ___ b. Disconnect and remove power cord from power distribution box.
- ___ c. Pull wiring from wall-mounted circuit breaker up through power cutouts and into power distribution box.
- ___ d. Connect wiring from wall-mounted circuit breaker to TBl in power distribution box as follows:

<u>50/60-Hz</u>		<u>Power</u>
<u>Circuit Breaker</u>		<u>Distribution Box</u>
Phase 1	to	TBl-2
Phase 2	to	TBl-3
Phase 3	to	TBl-4
Neutral	to	lug E1 (Safety ground)

- ___ e. Install power distribution box cover.

CONNECTING POWER AND EMC STRAPS (Sheet 12 of 14)

CONNECT OR REMOVE ELECTROMAGNETIC COMPATIBILITY STRAPS

Use this procedure either to connect electromagnetic compatibility (EMC) straps from the central computer cabinets to customer-supplied grid-ground terminals or to remove the preinstalled straps from the cabinets. Connection of the straps to a grid ground is normally optional. When the straps are not connected, they must be disconnected and removed from the central computer cabinets.

NOTE

Connections from an under-floor ground reference grid to EMC GND terminals are unnecessary with the usual shielded signal cables that go to and from the central computer. If a ground reference grid is present, it should connect to specified EMC terminals. If any peripheral equipment used with the central computer has unshielded cables, the central computer and all system components must connect to a ground reference grid. For additional information on this type of grounding, refer to EMC Grounding in section 1 of the Site Preparation manual.

Procedure prerequisites:

- 50/60-Hz power to the central computer is off.
- 400-Hz power to the central computer is off.

Parts and tools required:

- Braided grounding straps located inside interface box
- Phillips screwdriver
- 3/8-in-drive socket wrench set

CONNECTING POWER AND EMC STRAPS (Sheet 13 of 14)

CONNECT OR REMOVE ELECTROMAGNETIC COMPATIBILITY STRAPS (Cont'd)

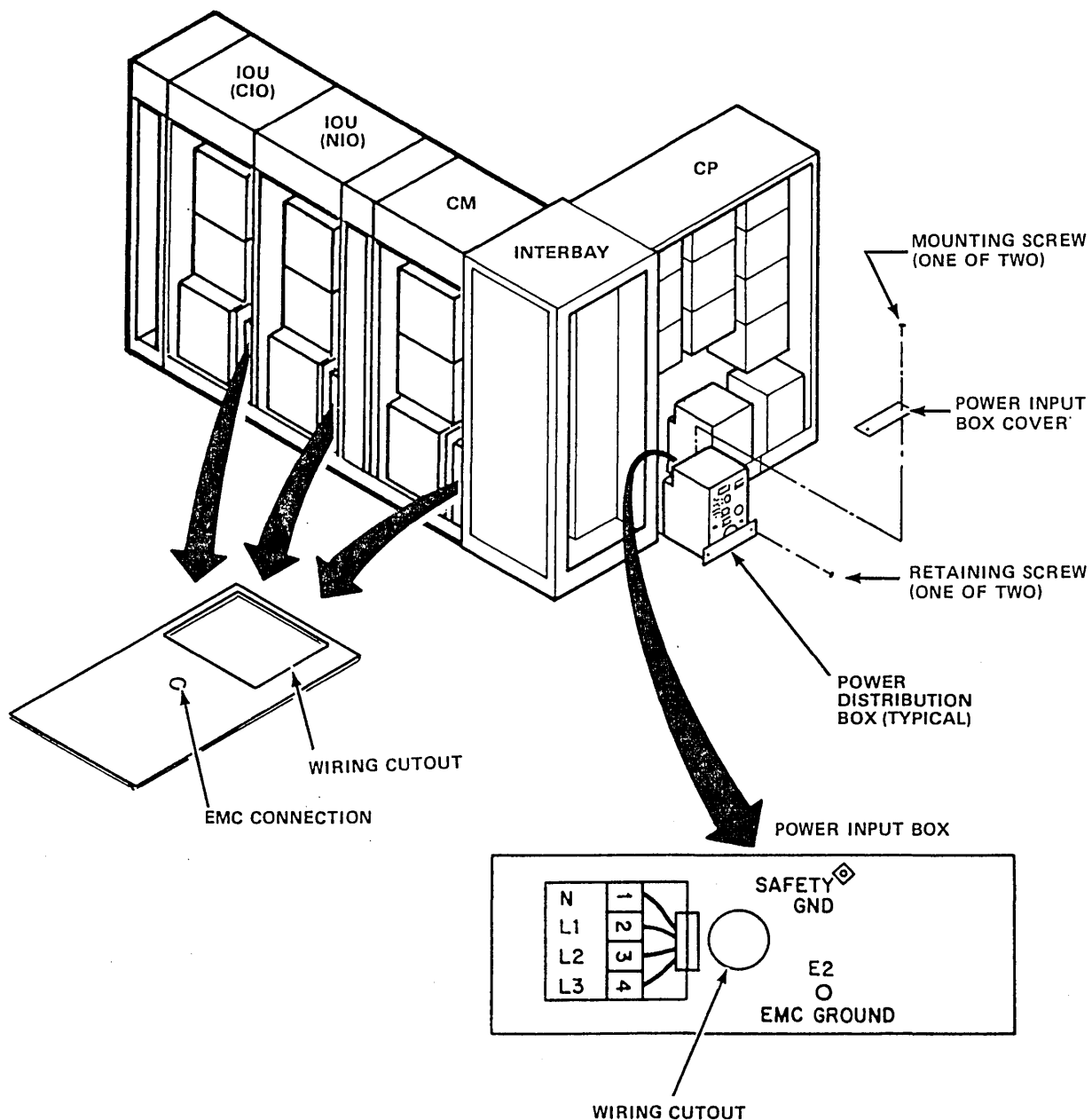
- ___ 1. Connect EMC strap to grid ground, or remove strap from front of CM cabinet (figure 3-16).
- ___ 2. Connect EMC strap to grid ground, or remove strap from front of IOU NIO cabinet.
- ___ 3. Connect EMC strap to grid ground, or remove strap from front of IOU CIO cabinet.
- ___ 4. Connect EMC strap to grid ground, or remove strap from column 1 of CP-0 cabinet as follows:

CAUTION

Pull power supplies slowly outward from columns while checking to ensure that attached rear cables are not damaged by being caught or pinched.

- ___ a. Remove two retaining screws from lower front panel of column or power distribution box, and slide box outward if not previously done.
- ___ b. Remove cover from power input box at bottom of column 1.
- ___ c. Connect or remove EMC strap. Connection of strap to grid ground requires routing strap out of water hose cutout to floor grid. If ground strap has a lug on its loose end, temporarily remove lug to route strap through hose cutout to floor grid.
- ___ d. Install cover on power input box, slide power distribution box into column, and install retaining screws.
- ___ 5. Repeat step 3 for column 1 in optional CP-1.
- ___ 6. Connect EMC strap to raised-floor grid. EMC strap is located inside interface box.
- ___ 7. Record time on flowchart for connecting power cords and EMC straps.

CONNECT OR REMOVE ELECTROMAGNETIC COMPATIBILITY STRAPS (Cont'd)



01305-2

Figure 3-16. Connecting or Removing EMC Straps

PREPARING WATER COOLING UNITS (Sheet 1 of 54)

Preparation of the water cooling units may include one or two 102-L/min (27-gal/min) units or one 220-L/min (58-gal/min) water cooling unit, depending on the system options. The preparation procedures for these units are:

The following four procedures apply only to each 102-L/min (27-gal/min) water cooling unit.

- Check valves on 102-L/min (27-gal/min) unit, CP, and CM.
- Check pump rotation on 102-L/min (27-gal/min) unit.
- Fill water tank on 102-L/min (27-gal/min) unit.
- Bleed air from 102-L/min (27-gal/min) unit.

The following four procedures apply only to a 220-L/min (58-gal/min) water cooling unit.

- Check valves on 220-L/min (58-gal/min) unit, CP, and CM.
- Check pump rotation on 220-L/min (58-gal/min) unit.
- Fill water tank on 220-L/min (58-gal/min) unit.
- Bleed air from 220-L/min (58-gal/min) unit.

The following procedures apply to both cooling unit sizes.

- Adjust water flow rates to CP and CM.
- Check water cooling unit temperature, pressure, and flow.
- Check site water flow rate.
- Bleed air from CP.
- Bleed air from IOU.

PREPARING WATER COOLING UNITS (Sheet 2 of 54)

CHECK VALVES ON 102-L/min (27-gal/min) UNIT, CP, and CM

Use this procedure to ensure that the valves on each 102-L/min (27-gal/min) water cooling unit are in their normal operating positions.

IS 102-L/min (27-gal/min) WATER COOLING UNIT PART OF INSTALLATION?

- If yes, continue with this procedure.
- If no, go to check valves procedure for 220-L/min (58-gal/min) unit, later in this section.

Procedure prerequisites:

- Connections for 50/60-Hz power to water cooling unit are complete.
- Wall-mounted circuit breaker that controls 50/60-Hz power to water cooling unit is set to OFF.
- Site water is at a temperature of not more than 10 °C (50 °F).

CAUTION

Improper valve settings can prevent the water cooling unit from operating, cause a fault to occur a few minutes after the water cooling unit begins operation, or cause water to leak from the water cooling system.

Procedure:

- ___ 1. Check valves on front of water cooling unit (figure 3-17) for the following:
 - ___ a. Access valve on heat exchanger has a valve cap.
 - ___ b. Sight glass drain valve is closed, fully clockwise.
 - ___ c. Sight glass shutoff valve is open, fully counterclockwise.
 - ___ d. Pump drain valve is closed, fully clockwise.

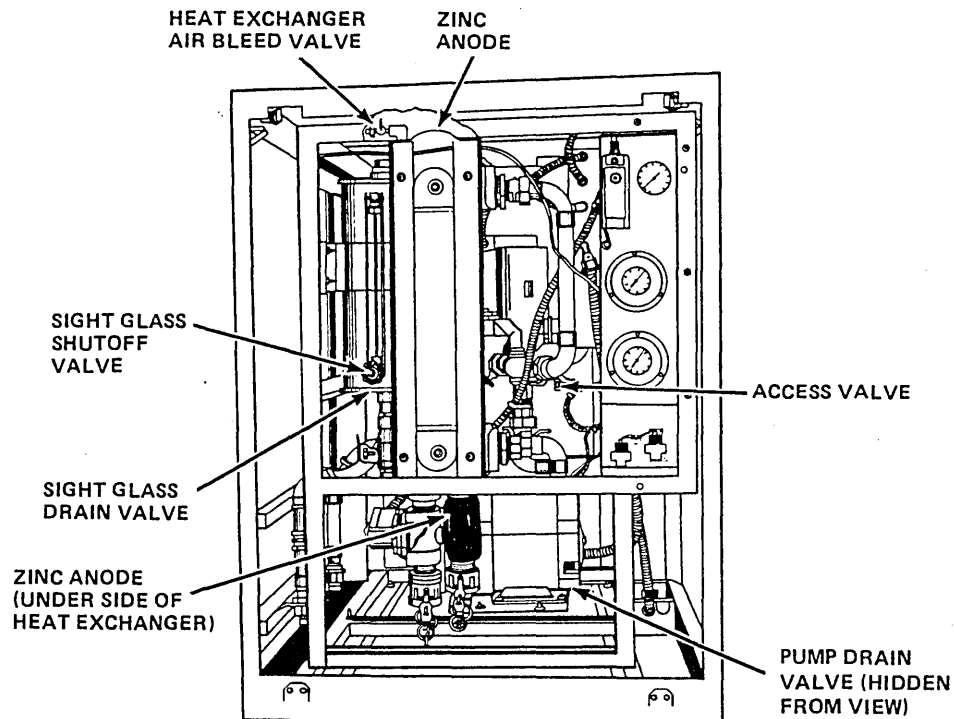
PREPARING WATER COOLING UNITS (Sheet 3 of 54)

CHECK VALVES ON 102-L/min (27-gal/min) UNIT, CP, and CM (Cont'd)

NOTE

Heat exchangers that have an air bleeder valve have two zinc anodes: one on the top of the heat exchanger and one on the bottom.

- ___ e. Insulation covering zinc anodes has been cut away to expose anodes for observation of possible water leakage.
- ___ f. Air bleeder valve on heat exchanger is closed, valve cock facing downward.



01503-2

Figure 3-17. Valve Locations on 102-L/min (27-gal/min) Unit (Front)

PREPARING WATER COOLING UNITS (Sheet 4 of 54)

CHECK VALVES ON 102-L/min (27-gal/min) UNIT, CP, and CM (Cont'd)

- ___ 2. Check valves on rear of water cooling unit (figure 3-18) for the following:
- ___ a. Air vent on heat exchanger is closed, fully clockwise.
 - ___ b. Water tank drain valve is closed, fully clockwise.
 - ___ c. Pump inlet and outlet valves are open, fully counterclockwise.
 - ___ d. Strainer inlet and outlet valves are open, fully counterclockwise.
 - ___ e. Strainer drain valve is closed, fully clockwise.
 - ___ f. Water tank inlet valve is open, fully counterclockwise.

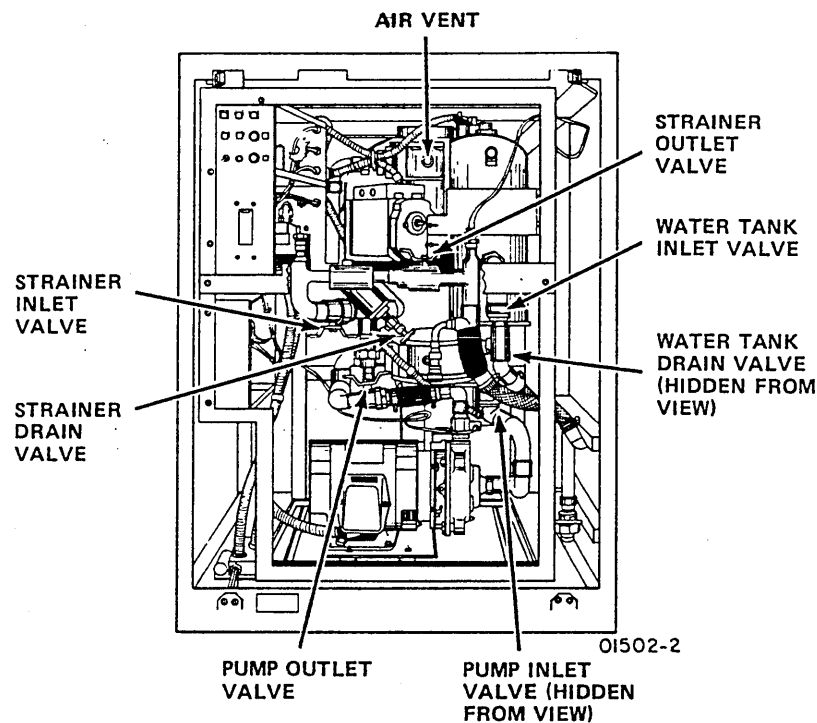


Figure 3-18. Valve Locations on 102-L/min (27-gal/min) Unit (Rear)

PREPARING WATER COOLING UNITS (Sheet 5 of 54)

CHECK VALVES ON 102-L/min (27-gal/min) UNIT, CP, and CM (Cont'd)

- ___ 3. Close bypass valve on side of water cooling unit (figure 3-19) by turning it fully clockwise.
- ___ 4. Open supply and return valves in CP-0 and CP-1 columns.
- ___ 5. Open flow control valves on water return manifold(s) under raised floor for CP-0, CP-1, and CM. Later procedures specify final adjustments of these valves.
- ___ 6. Remove two orange shipping brackets from inside bottom of water cooling unit by loosening four mounting bolts on pump assembly frame. Slide brackets out and store in bottom of water cooling unit. Tighten bolts, but do not overtighten.

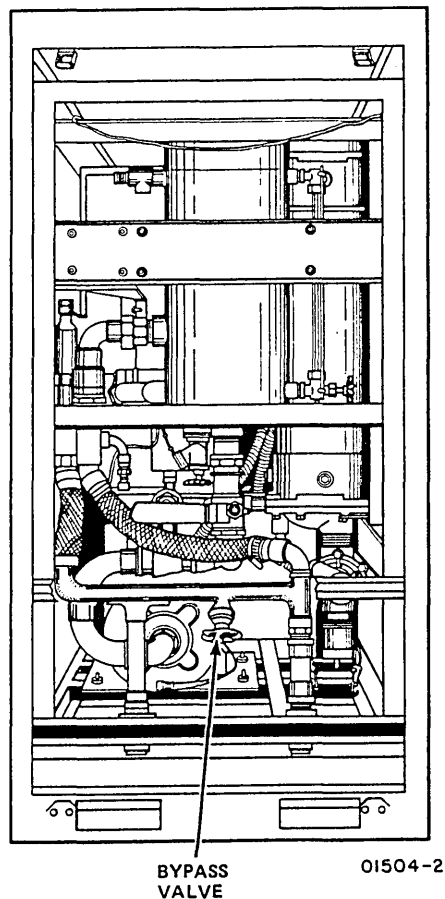


Figure 3-19. Bypass Valve on 102-L/min (27-gal/min) Unit (Side)

PREPARING WATER COOLING UNITS (Sheet 6 of 54)

CHECK VALVES ON 102-L/min (27-gal/min) UNIT, CP, and CM (Cont'd)

7. Check that 3-way valve handles on supply and return hose assemblies are set as shown in figure 3-20.

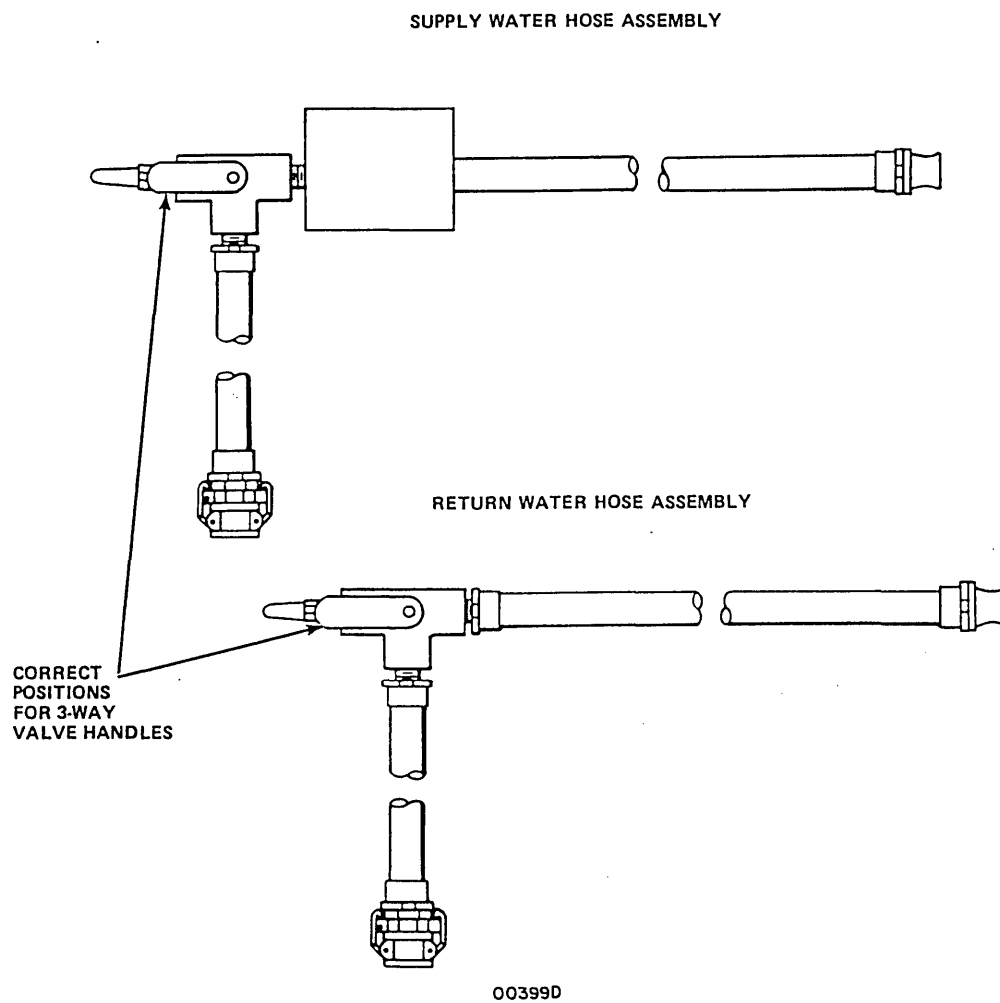


Figure 3-20. Supply and Return Hose Assemblies 3-Way Valves

PREPARING WATER COOLING UNITS (Sheet 7 of 54)

CHECK PUMP ROTATION ON 102-L/min (27-gal/min) UNIT

Use this procedure to ensure that the pump motor on each 102-L/min (27-gal/min) water cooling unit turns in the correct direction after the application of power.

Procedure prerequisites:

- Power connections to water cooling unit are complete.
- Wall-mounted circuit breaker that controls 50/60-Hz power to water cooling unit is set to OFF.
- Valves for the water cooling system are set according to previous procedures.
- Installer 2 has verified that the ALT2 transformer, inside the power distribution box, in the water cooling unit has its connections wired for the available site 50/60-Hz voltage.

Equipment and parts required:

- Distilled water, 7.6 L (2 gal). Later procedures require an additional 30.3 L (8 gal) of water to complete filling of water cooling unit water tank.
- Funnel.
- Adjustable wrench.

Procedure:

- ___ 1. Set INPUT POWER DISCONNECT circuit breaker on water cooling unit (figure 3-21) to OFF.
- ___ 2. Set mode switch at rear of unit to LOCAL.
- ___ 3. Set wall-mounted circuit breaker that controls 50/60-Hz power to water cooling unit to ON.
- ___ 4. Use adjustable wrench to remove fill plug on top of water tank.
- ___ 5. Use funnel to add 7.6 L (2 gal) of distilled water to water tank.
- ___ 6. Loosen water pump air bleed screw enough to allow water to seep from around screw and release any trapped air.

If water seeps from around screw, tighten it and proceed to step 7.

If water does not seep from around screw, perform the following steps:

- ___ a. Remove screw from water pump.
- ___ b. Fill water pump completely, through screw hole, with distilled water.
- ___ c. Install screw.

PREPARING WATER COOLING UNITS (Sheet 8 of 54)

CHECK PUMP ROTATION ON 102-L/min (27-gal/min) UNIT (Cont'd)

- ___ 7. Rotate pump by momentarily applying 50/60-Hz power to pump motor. Do this by setting INPUT POWER DISCONNECT circuit breaker at rear of cooling unit to ON and then to OFF.
- ___ 8. Observe water pump motor from rear of cooling unit as it slows down. Motor must rotate in same direction as arrow on motor. If motor does not rotate in correct direction, perform the following steps:
 - ___ a. Set circuit breaker that controls 50/60-Hz power to water cooling unit to OFF.
 - ___ b. Remove cover plate from 50/60-Hz power input box on water cooling unit.
 - ___ c. Interchange any two wires connected to A5TB1-2, A5TB1-3, and A5TB1-4 in 50/60-Hz power input box.
 - ___ d. Set circuit breaker that controls 50/60-Hz power to water cooling unit to ON.
 - ___ e. Repeat steps 7 and 8, when second 102-L/min (27-gal/min) water cooling unit is part of installation.

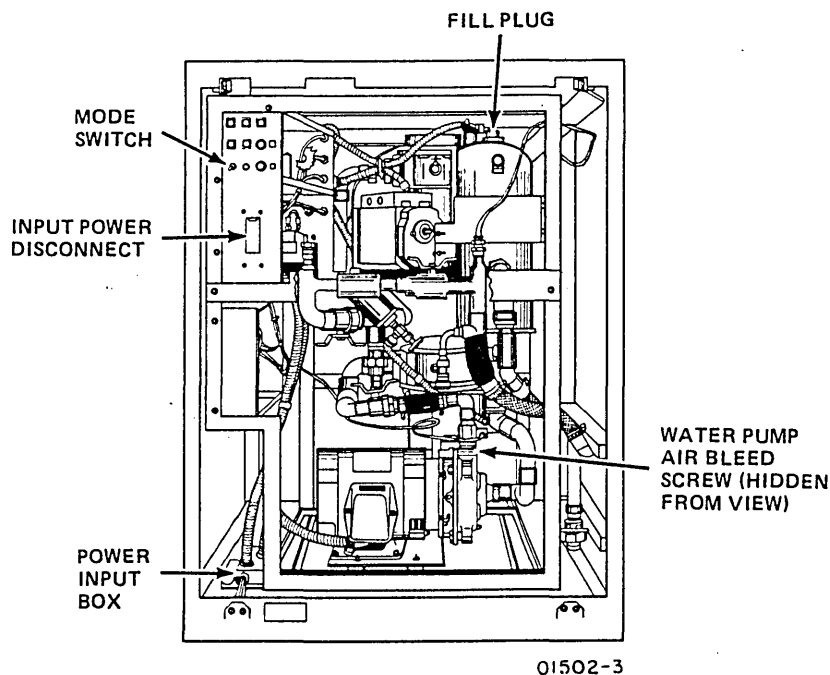


Figure 3-21. Pump Rotation Check on 102-L/min (27-gal/min) Unit

PREPARING WATER COOLING UNITS (Sheet 9 of 54)

CHECK PUMP ROTATION ON 102-L/min (27-gal/min) UNIT (Cont'd)

- ___ 9. Set wall-mounted circuit breaker that controls 50/60-Hz power to water cooling unit to OFF.
- ___ 10. Replace cover plate on 50/60-Hz power input box, if removed.
- ___ 11. Do not replace fill plug on top of water tank at this time.

PREPARING WATER COOLING UNITS (Sheet 10 of 54)

FILL WATER TANK ON 102-L/min (27-gal/min) UNIT

Use this procedure to complete the filling of the water tank in each of the 102-L/min (27-gal/min) water cooling units.

Procedure prerequisites:

- Previous water cooling unit procedures are complete.
- Water tank fill plug is removed from water cooling unit, and tank contains 7.6 L (2 gal) of distilled water from pump rotation check.
- Mode switch of water cooling unit is set to LOCAL.

Tools and materials required:

- Distilled water, approximately 30.3 L (8 gal)
- Cobratec corrosion inhibitor
- Biocide chemical microorganism control
- Water treatment pH indicator kit
- Disposable gloves
- Funnel
- Safety glasses
- Water tank drain hose
- Empty water container, 4 to 8 L (1 to 2 gal)

Procedure:

- ___ 1. Set wall-mounted circuit breaker that controls 50/60-Hz power to water cooling unit to ON.

NOTE

The water added to the water tank may appear in the sight glass to have a green/blue tint. This is from antifreeze residue. It is a normal condition that clears up in several hours.

PREPARING WATER COOLING UNITS (Sheet 11 of 54)

FILL WATER TANK ON 102-L/min (27-gal/min) UNIT (Cont'd)

- ___ 2. Use funnel to add distilled water to water tank until sight glass indicates three-fourths full.

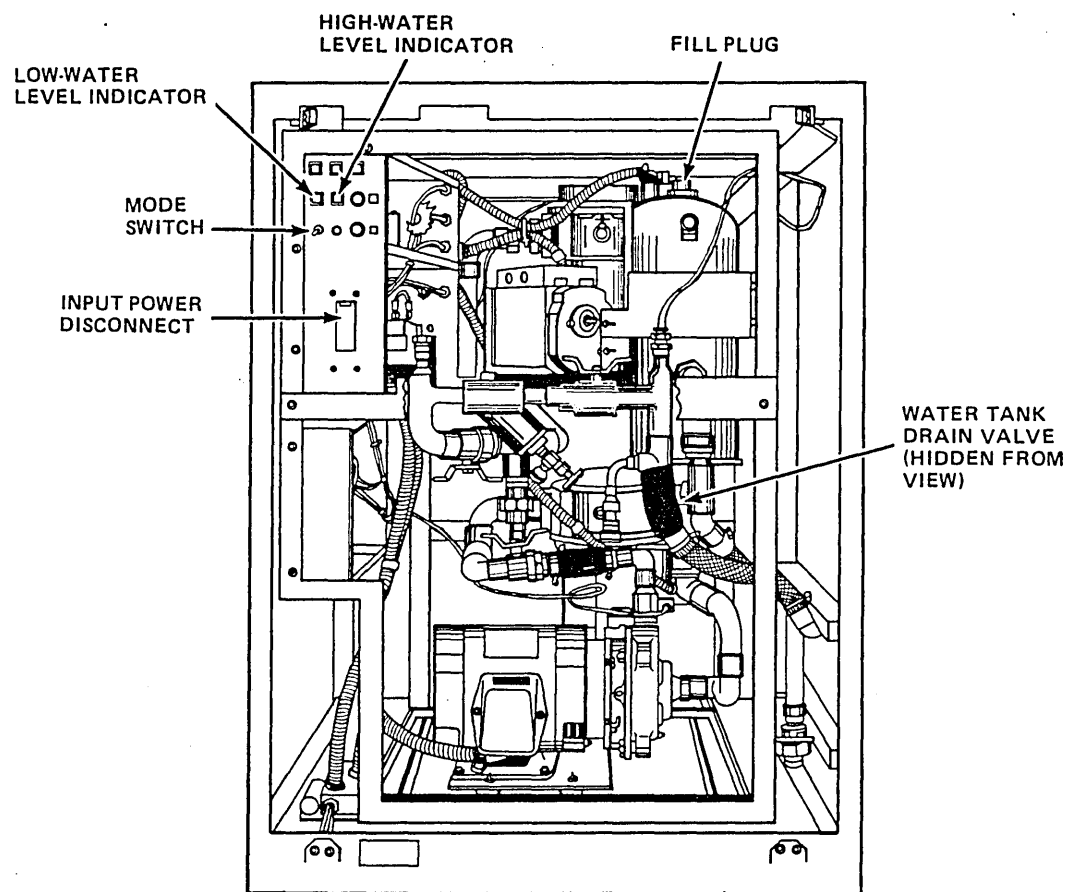
NOTE

Do not fill tank more than three-fourths full with power removed.

- ___ 3. Apply power to water pump by setting INPUT POWER DISCONNECT circuit breaker (figure 3-22) on rear of unit to ON. After water pump motor runs a few seconds, water level in sight glass goes down as water is pumped throughout cooling system.
- ___ 4. Add water as necessary to maintain water level at three-fourths full in sight glass.
- If water pump motor stops operating while water is being added, and LOW WATER LEVEL indicator on power disconnect box lights, set INPUT POWER DISCONNECT switch to OFF and repeat steps 2, 3, and 4.
 - If water pump motor stops operating and HIGH WATER LEVEL indicator on power disconnect box lights, perform the following steps:
 - ___ a. Set INPUT POWER DISCONNECT switch on water cooling unit to OFF.
 - ___ b. Attach drain hose to water tank drain valve, and place hose end in empty water container.
 - ___ c. Open water tank drain valve, and drain water into container until sight glass indicates three-fourths full.
 - ___ d. Close drain valve.
 - ___ e. Repeat steps 3 and 4 until water level in sight glass remains at three-fourths full.
 - ___ f. Remove drain hose and container.
- ___ 5. Permit water cooling unit to operate for a time to allow trapped air to circulate through water and escape from water tank. Bubbles stop surfacing in tank when trapped air is released.
- ___ 6. Inspect all water connections in CP and CM for leaks. Correct any leaking connections.

PREPARING WATER COOLING UNITS (Sheet 12 of 54)

FILL WATER TANK ON 102-L/min (27-gal/min) UNIT (Cont'd)



01502-4

Figure 3-22. Water Tank Filling on 102-L/min (27-gal/min) Unit

PREPARING WATER COOLING UNITS (Sheet 13 of 54)

FILL WATER TANK ON 102-L/min (27-gal/min) UNIT (Cont'd)

- ___ 7. Check alkalinity of water in water cooling unit, using water treatment pH indicator kit (figure 3-23) as follows:
- ___ a. Drain small amount of water from sight glass drain valve into clean container. Pour some water from container into both color viewing tubes. Rinse tubes thoroughly and leave them empty.

WARNING

The chemicals in the wide range 4 pH indicator solution may be hazardous to the health and safety of the user if inappropriately handled. Read all warnings included with the test kit before using it.

- ___ b. Pour additional water from container into both color viewing tubes, filling tubes only to their 5-mL marks.
- ___ c. Add six drops of wide range 4 pH indicator solution to one sample tube. Cover tube with stopper, and swirl it to mix solution with water sample.
- ___ d. Insert tube with treated water into right opening of color comparator.
- ___ e. Insert tube with untreated water sample into left opening of color comparator.

PREPARING WATER COOLING UNITS (Sheet 14 of 54)

FILL WATER TANK ON 102-L/min (27-gal/min) UNIT (Cont'd)

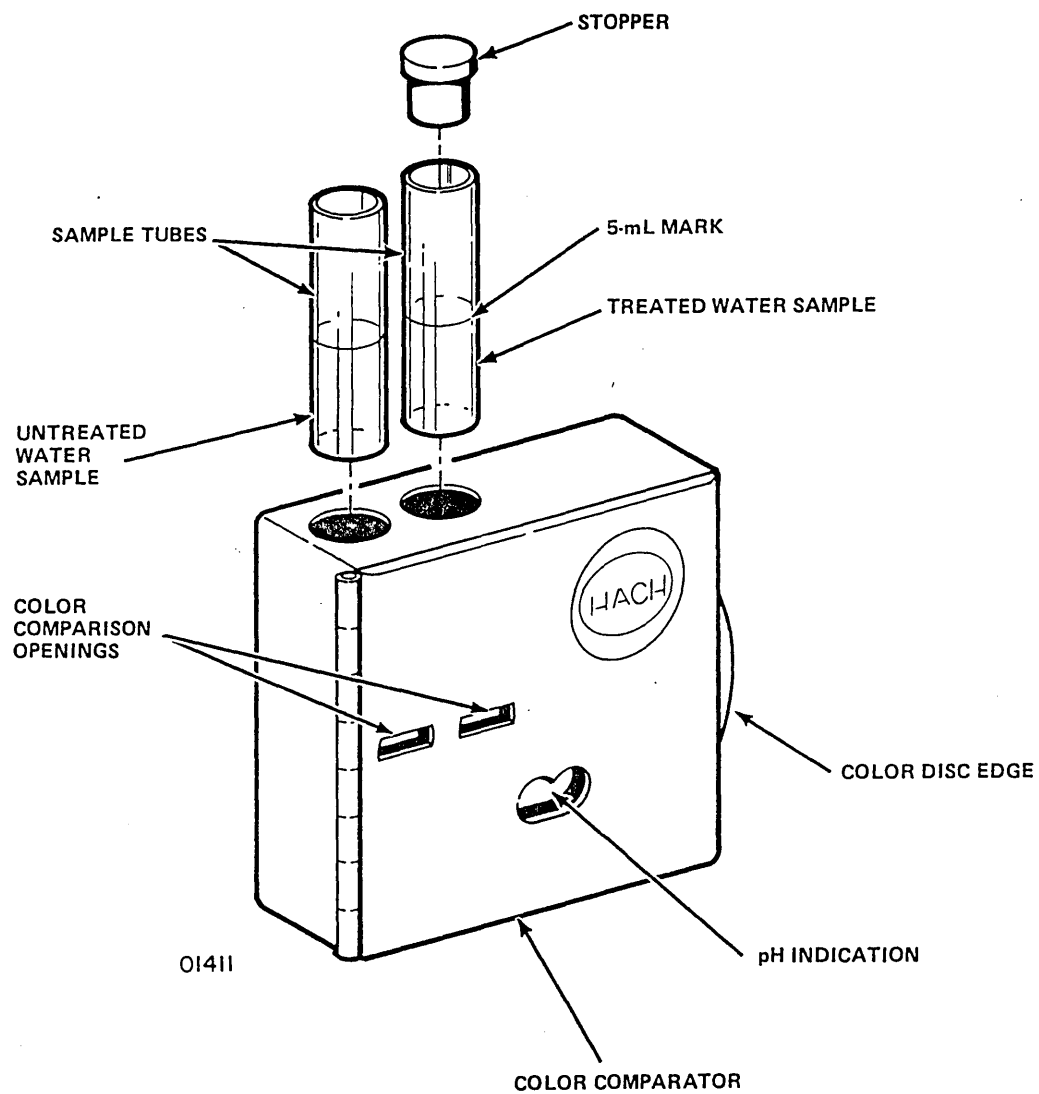


Figure 3-23. Water Treatment pH Indicator Kit

PREPARING WATER COOLING UNITS (Sheet 15 of 54)

FILL WATER TANK ON 102-L/min (27-gal/min) UNIT (Cont'd)

- ___ f. Hold color comparator up to light source and view color comparator openings. Rotate color disc by turning its edge to obtain color match in openings.
- ___ g. Read pH indicator on front of color comparator. Correct alkalinity (pH) indication is between 7.0 and 8.5. Rinse sample tubes.

If pH is more than 8.5, dilute water in water cooling unit as follows:

- ___ 1) Drain 3.8 L (1-gal) of water from water cooling unit.
- ___ 2) Add 3.8 L (1-gal) of untreated distilled water to water cooling unit.
- ___ 3) Wait 15-min and repeat this entire step to ensure correct pH level between 7.0 and 8.5.

If pH is less than 7.0 increase pH level as follows:

- ___ 1) Put on safety glasses and disposable rubber or plastic gloves.

WARNING

Do not inhale vapors from Cobratec or allow it to contact skin or eyes. Cobratec contains a sodium hydroxide solution, which can severely burn skin and eyes and cause harm if a large quantity is inhaled.

- ___ 2) Add one drop of Cobratec corrosion inhibitor to each 3.8 L (1 gal) of water in water tank. Cobratec has an indefinite shelf life.
- ___ 3) Wait 15-min and repeat this entire step to ensure correct pH level between 7.0 and 8.5
- ___ 8. Rinse and store sample tubes in color comparator.
- ___ 9. Leave safety glasses and gloves on.

PREPARING WATER COOLING UNITS (Sheet 16 of 54)

FILL WATER TANK ON 102-L/min (27-gal/min) UNIT (Cont'd)

WARNING

Do not inhale vapors from biocide chemical microorganism control or allow it to contact skin or eyes. Chemical microorganism control contains polyoxyethylene (dimethyliminio) ethylene (dimethyliminio) ethylene dichloride, a substance that can cause severe eye and skin irritation.

- ___ 10. Wait at least 15 min after adding Cobratec. Then add 4 drops of biocide chemical microorganism control to each 3.8 L (1 gal) of water in tank. Note expiration date on biocide container to ensure its usability.
- ___ 11. Remove safety glasses and gloves.
- ___ 12. Do not install fill plug on top of water tank at this time.

NOTE

Continue operation of water cooling unit to perform remaining checkout procedures.

PREPARING WATER COOLING UNITS (Sheet 17 of 54)

BLEED AIR FROM 102-L/min (27-gal/min) UNIT

Use this procedure to release any trapped air in the site water lines of the 50-L/min (14-gal/min) water cooling unit.

Procedure prerequisites:

- Previous water cooling unit procedures are complete.
- Water cooling unit is operating in local mode.

Material required:

- Paper tissues or cloth towel for absorbing water

Procedure:

- ___ 1. Open site (customer) water supply and return valves to water cooling unit.
- ___ 2. Place towel or tissues around heat exchanger air bleed valve (figure 3-24) to absorb water.
- ___ 3. Open air bleed valve slightly until air escapes from valve and water begins coming out.
- ___ 4. Remove towel or tissues.
- ___ 5. Allow water cooling unit to operate several hours, permitting air to escape from chassis water before installing fill plug on top of water cooling unit water tank.

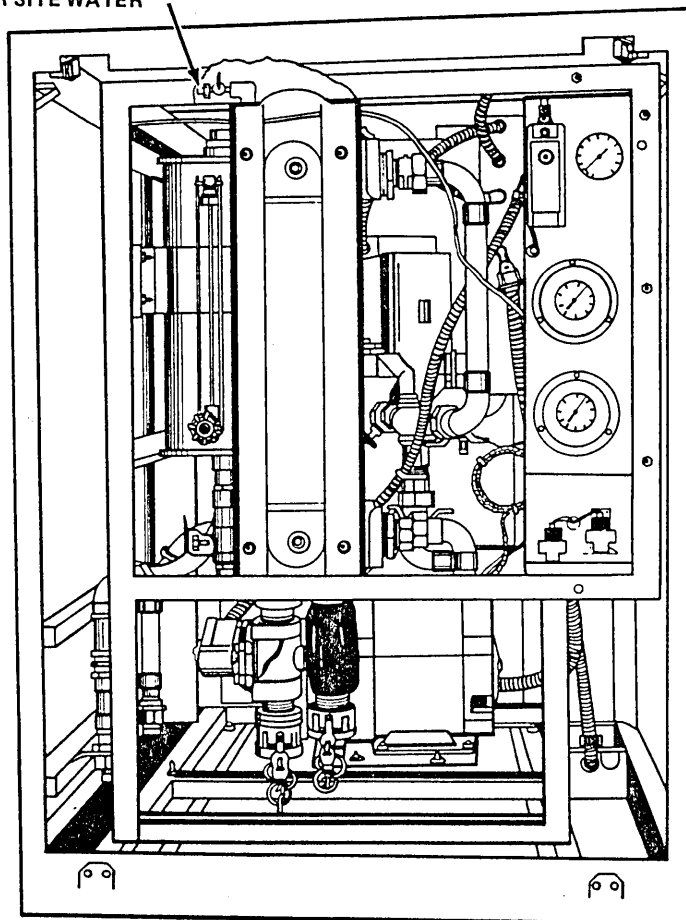
IS A SECOND 102-L/min (27-gal/min) UNIT PART OF INSTALLATION?

- If yes, repeat 102-L/min (27-gal/min) unit procedures for second unit. Then go to procedure for bleeding air from CP.
- If no, omit procedures for 102-L/min (27-gal/min) unit. Go to procedure for bleeding air from CP.

PREPARING WATER COOLING UNITS (Sheet 18 of 54)

BLEED AIR FROM 102-L/min (27-gal/min) UNIT (Cont'd)

HEAT EXCHANGER
AIR BLEED VALVE
FOR SITE WATER



01503-3

Figure 3-24. Air Bleed Valve 102-L/min (27-gal/min) Unit

PREPARING WATER COOLING UNITS (Sheet 19 of 54)

CHECK VALVES ON 220-L/min (58-gal/min) UNIT, CP, and CM

Use this procedure to ensure that 220-L/min (58-gal/min) water cooling unit valves are in their normal operating positions.

Procedure prerequisites:

- Connections for 50/60-Hz power to water cooling unit are complete.
- Wall-mounted circuit breaker that controls 50/60-Hz power to water cooling unit is set to OFF.
- Site water is at a temperature of not more than 10 °C (50 °F).

CAUTION

Improper valve settings prevent the water cooling unit from operating, cause a fault to occur a few minutes after the water cooling unit begins operation, or cause water to leak from the water cooling system.

Procedure:

- ___ 1. Open water cooling unit supply and return valves (figure 3-25) by turning them fully counterclockwise.
- ___ 2. Set chassis bypass valve approximately one-fourth turn open. A later adjustment of this valve may be necessary. Completely closing bypass valve, turning valve handle perpendicular to water pipe, may cause a HIGH PRESSURE fault. Completely opening bypass valve, turning valve handle parallel to water pipe, may cause a LOW PRESSURE fault.
- ___ 3. Check valves for the following:
 - ___ a. Heat exchanger air bleed valve is closed, fully clockwise.
 - ___ b. Sight glass drain valve is closed, fully clockwise.
 - ___ c. Strainer bypass valve handle is in up position.
 - ___ d. Water pump drain valve is closed, fully clockwise.
 - ___ e. Water tank drain valve is closed, fully clockwise.
- ___ 4. Open supply and return valves in CP-0 and CP-1 columns and in CM.
- ___ 5. Open flow control valves on water return manifold(s) under raised floor for CP-0, CP-1, and CM.

PREPARING WATER COOLING UNITS (Sheet 20 of 54)

CHECK VALVES ON 220-L/min (58-gal/min) UNIT, CP, and CM (Cont'd)

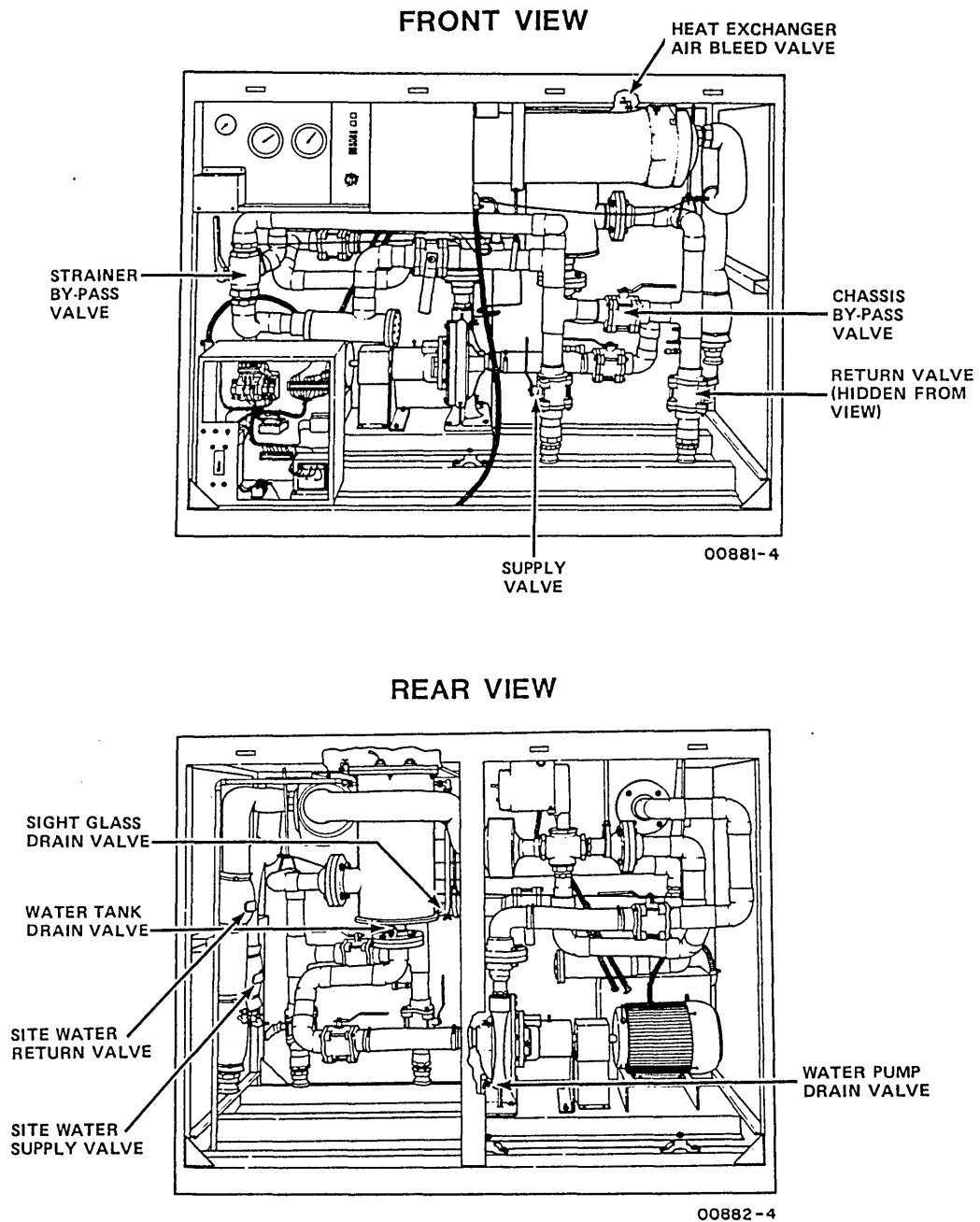


Figure 3-25. Valve Locations on 220-L/min (58-gal/min) Unit

PREPARING WATER COOLING UNITS (Sheet 21 of 54)

CHECK VALVES ON 220-L/min (58-gal/min) UNIT, CP, and CM (Cont'd)

6. Check that 3-way valve handles on supply and return hose assemblies are set as shown in figure 3-26.

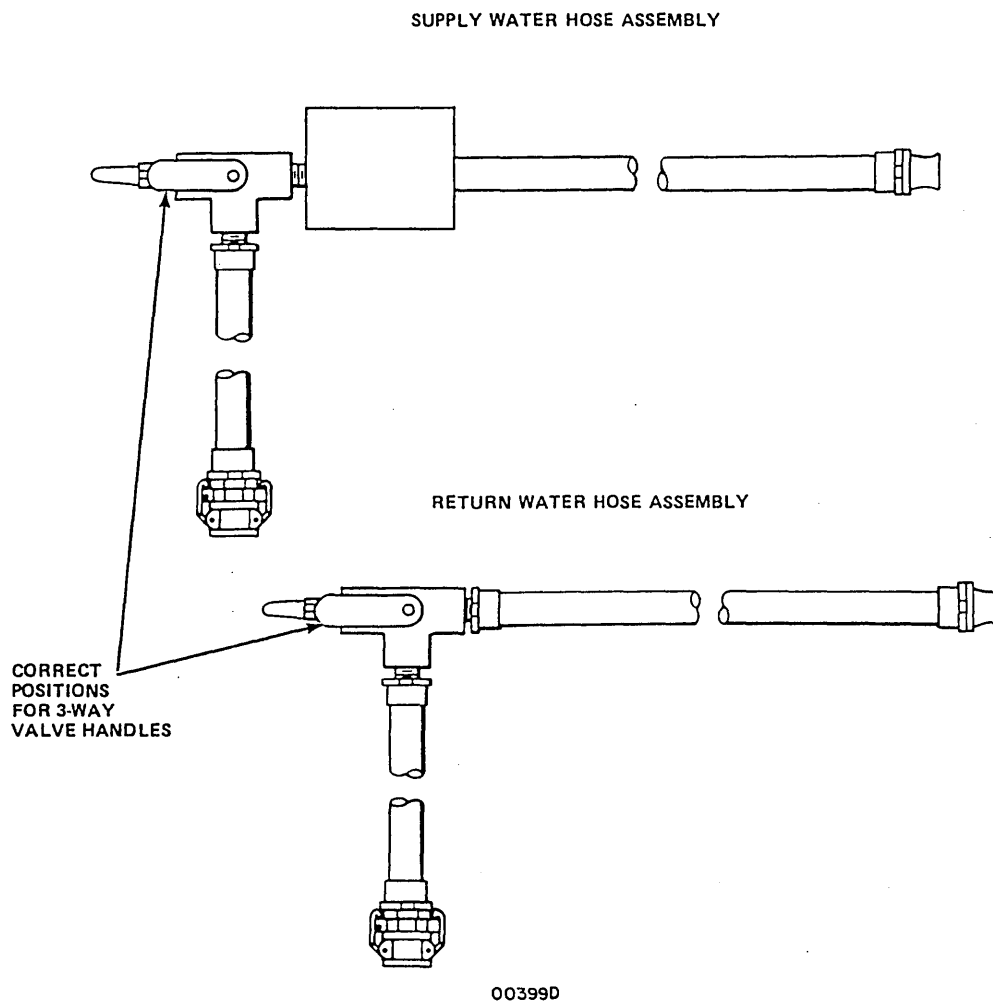


Figure 3-26. Supply and Return Hose Assemblies 3-Way Valves

PREPARING WATER COOLING UNITS (Sheet 22 of 54)

CHECK PUMP ROTATION ON 220-L/min (58-gal/min) UNIT

Use this procedure to ensure that the 220-L/min (58-gal/min) water cooling unit pump motor turns in the correct direction after the application of power.

Procedure prerequisites:

- Wall-mounted circuit breaker that controls 50/60-Hz power to water cooling unit is set to OFF.
- Valves for the water cooling unit are set according to previous procedures.
- Installer 2 has verified that the pump motor and control transformer wiring are correct for available site power.

Tools and materials required:

- Distilled water, 19 L to 23 L (5 gal to 6 gal). Later procedures require an additional 102 L to 106 L (27 gal to 28 gal of water) to complete filling of water tank.
- Funnel.
- Adjustable wrench.

Procedure:

- ___ 1. Set INPUT POWER DISCONNECT circuit breaker (figure 3-27) on front of water cooling unit to OFF.
- ___ 2. Set mode switch on water cooling front control panel unit to LOCAL.
- ___ 3. Set MANUAL/AUTO switch on front of water cooling unit power distribution box to MANUAL.
- ___ 4. Set wall-mounted circuit breaker that controls 50/60-Hz power to water cooling unit to ON.
- ___ 5. Use adjustable wrench to remove fill plug on top of water tank.
- ___ 6. Use funnel to add 19 L to 23 L (5 gal to 6 gal) of distilled water to water tank. Water cooling unit should indicate a LOW LEVEL fault before water tank is full.
- ___ 7. Loosen water pump air bleed valve enough to allow water to seep from around valve and release any trapped air.
- ___ 8. Tighten air bleed valve.

PREPARING WATER COOLING UNITS (Sheet 23 of 54)

CHECK PUMP ROTATION ON 220-L/min (58-gal/min) UNIT (Cont'd)

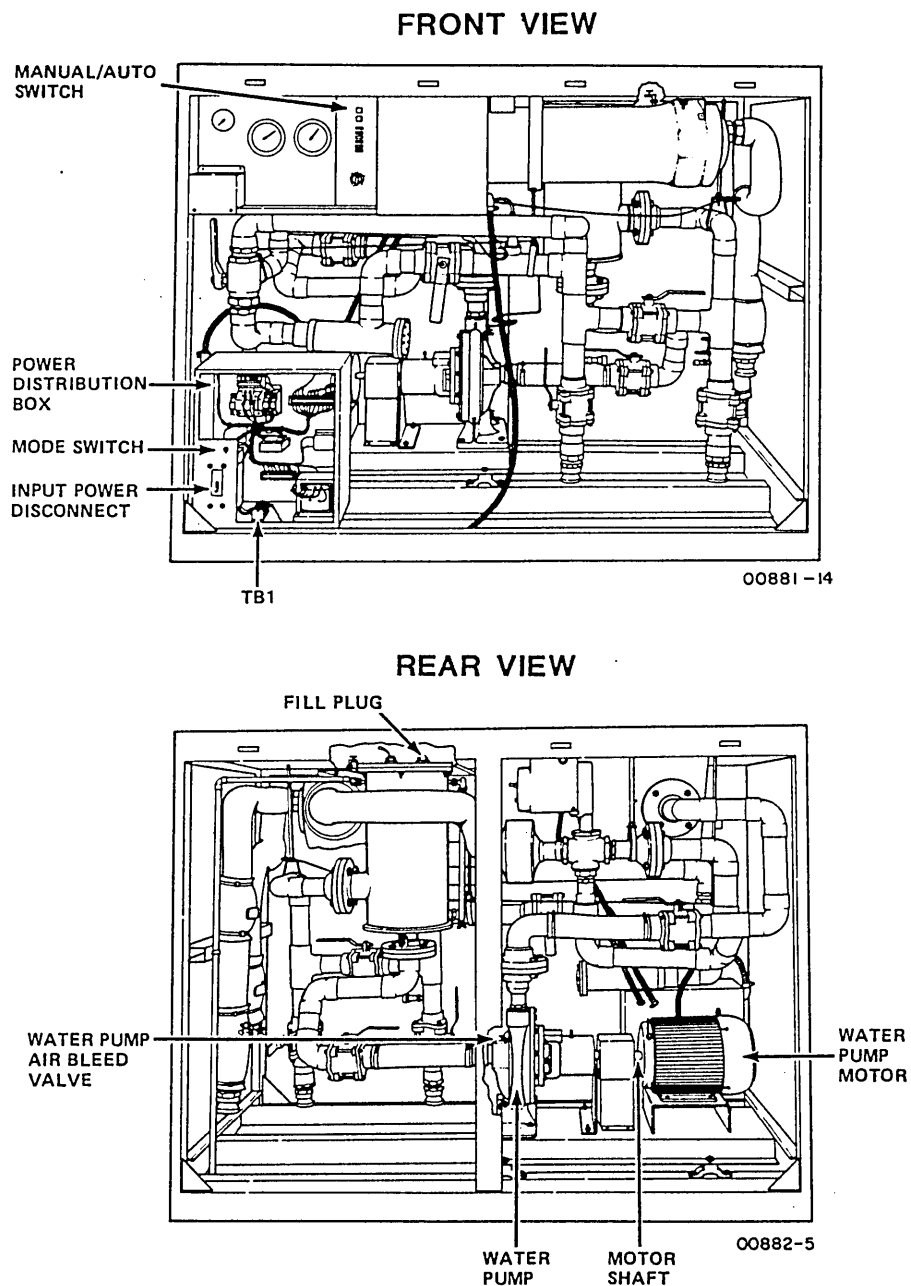


Figure 3-27. Pump Rotation Check on 220-L/min (58-gal/min) Unit

PREPARING WATER COOLING UNITS (Sheet 24 of 54)

CHECK PUMP ROTATION ON 220-L/min (58-gal/min) UNIT (Cont'd)

- ___ 9. Rotate motor by momentarily applying 50/60-Hz power to motor. Do this by setting INPUT POWER DISCONNECT circuit breaker on front of water cooling unit to ON and then to OFF.
- ___ 10. Observe rotation of water pump motor shaft as it slows down. Shaft must rotate in same direction as arrow at top of pump housing. If shaft does not rotate in correct direction, perform the following steps:
 - ___ a. Set circuit breaker that controls 50/60-Hz power to water cooling unit to OFF.
 - ___ b. Remove vented cover from water cooling unit power distribution box.
 - ___ c. Interchange any two wires connected to TB1-2, TB1-3, and TB1-4 in 50/60-Hz power distribution box.
 - ___ d. Set circuit breaker that controls 50/60-Hz power to water cooling unit to ON.
 - ___ e. Repeat steps 8 and 9.
- ___ 11. Set wall-mounted circuit breaker that controls 50/60-Hz power to water cooling unit to OFF.
- ___ 12. Replace front cover on power distribution box, if removed.
- ___ 13. Do not replace fill plug on top of water tank at this time.

PREPARING WATER COOLING UNITS (Sheet 25 of 54)

FILL WATER TANK ON 220-L/min (58-gal/min) UNIT

Use this procedure to complete the filling of the water tank in the 220-L/min (58-gal/min) water cooling unit and the optional water cooling unit.

Procedure prerequisites:

- Water cooling unit water tank fill plug is removed, and tank contains 19 L to 23 L (5 gal to 6 gal) of distilled water from pump rotation check.
- All flow control valves that connect to hoses are open on the 13-port and 2-port water return manifolds.
- Any water manifold port that does not have a hose connection has a cap.
- Water cooling unit mode switch is set to LOCAL, and MANUAL/AUTO switch is set to MANUAL.

Tools and materials required:

- Distilled water, 102 L to 106 L (27 gal to 28 gal)
- Cobratec corrosion inhibitor
- Biocide chemical microorganism control
- Water treatment pH indicator kit
- Disposable gloves
- Funnel
- Safety glasses
- Water tank drain hose
- Empty water container, 4 L to 8 L (1 gal to 2 gal)
- Paper tissues or towel for absorbing water

Procedure:

1. Set wall-mounted circuit breaker that controls 50/60-Hz power to water cooling unit to ON.

NOTE

The water added to the water tank may appear in the sight glass (figure 3-28) to have a green/blue tint. This is from antifreeze residue. It is a normal condition that clears up in several hours.

PREPARING WATER COOLING UNITS (Sheet 26 of 54)

FILL WATER TANK ON 220-L/min (58-gal/min) UNIT (Cont'd)

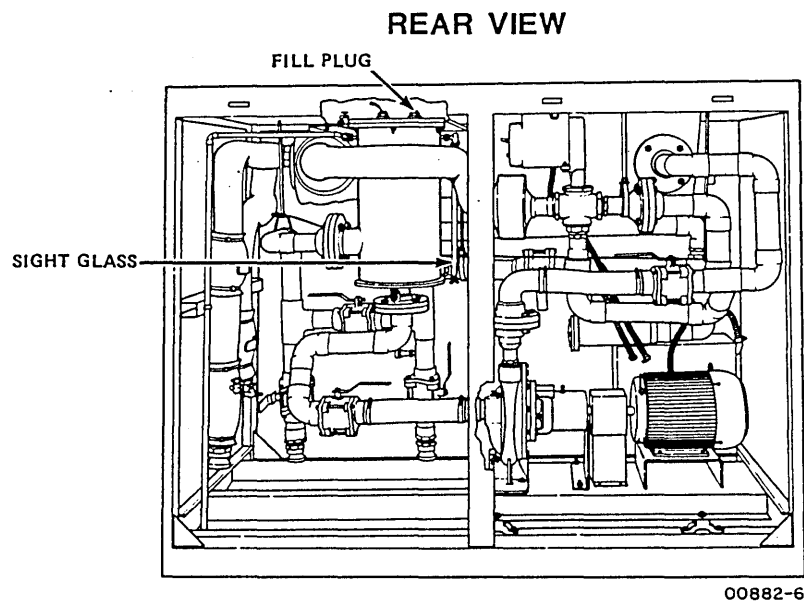
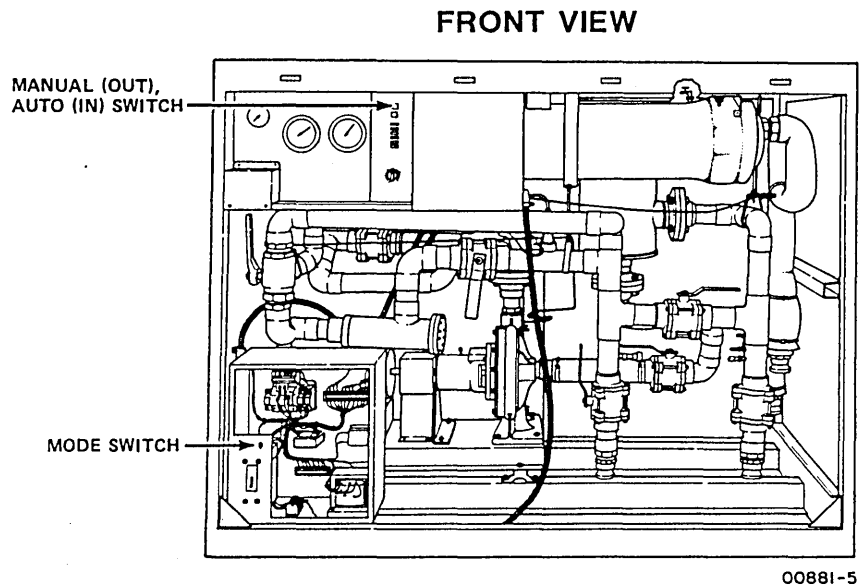


Figure 3-28. Water Tank Filling on 220-L/min (58-gal/min) Unit

PREPARING WATER COOLING UNITS (Sheet 27 of 54)

FILL WATER TANK ON 220-L/min (58-gal/min) UNIT (Cont'd)

NOTE

Do not fill tank more than three-fourths full with power removed.

- ___ 2. Use a funnel to add distilled water to water tank at fill plug hole until sight glass is three-fourths full, while checking for LOW/HIGH LEVEL faults.
- ___ 3. Place paper tissues around water pump air bleed valve, and open valve until air escapes. Remove tissues.
- ___ 4. Set INPUT POWER DISCONNECT circuit breaker on front of unit (figure 3-29) to ON. After water pump motor runs a few seconds, water level in sight glass goes down as water circulates throughout cooling system.
- ___ 5. Add water as necessary to maintain water level in sight glass at three-fourths full. If water pump motor stops while water is being added and HIGH/LOW LEVEL indicator on water cooling unit indicator panel lights, observe water cooling unit sight glass.
 - If sight glass indicates a low water level, repeat steps 2 and 4.
 - If sight glass indicates a high water level, perform the following substep(s):
 - ___ a. Bleed air from chassis. (Refer to bleed procedures later in this part of the manual.) Continue with these substeps only if high water level is still present.
 - ___ b. Set INPUT POWER DISCONNECT switch on water cooling unit to OFF.
 - ___ c. Attach drain hose to water tank drain valve, and place hose end in empty water container.
 - ___ d. Open water tank drain valve, and drain water into container until sight glass indicates three-fourths full.
 - ___ e. Close drain valve.
 - ___ f. Repeat steps 2 and 3 until water level in sight glass remains at three-fourths full.
 - ___ g. Remove drain hose and container.

PREPARING WATER COOLING UNITS (Sheet 28 of 54)

FILL WATER TANK ON 220-L/min (58-gal/min) UNIT (Cont'd)

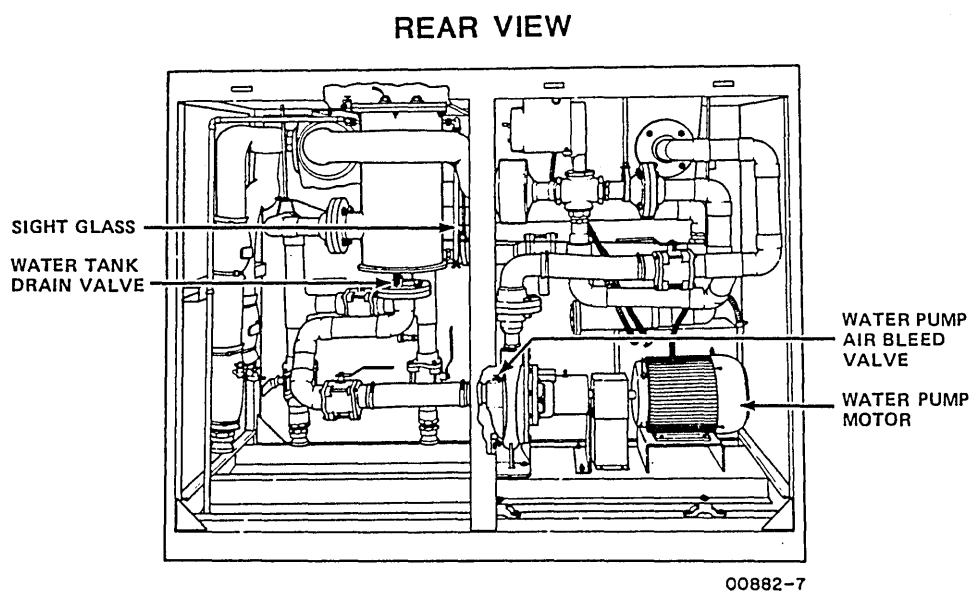
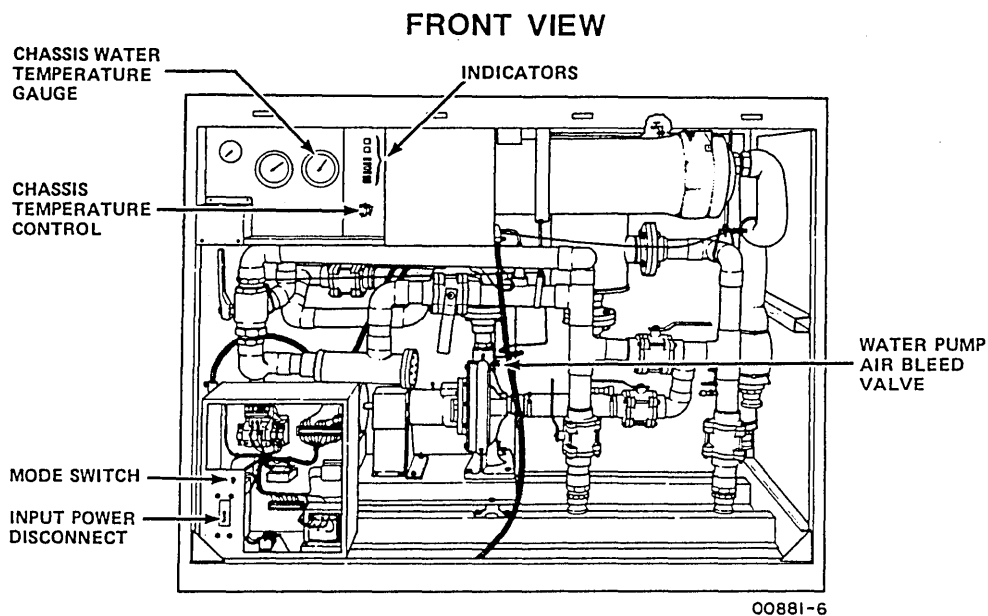


Figure 3-29. Water Tank Filling on 220-L/min (58-gal/min) Unit

PREPARING WATER COOLING UNITS (Sheet 29 of 54)

FILL WATER TANK ON 220-L/min (58-gal/min) UNIT (Cont'd)

- ___ 6. Permit water cooling unit to operate for a time to allow trapped air to circulate through water and escape from water tank. Bubbles stop surfacing in tank when trapped air is released.
- ___ 7. Inspect all water connections in water cooling units of CP and CM for leaks. Correct any leaks.

PREPARING WATER COOLING UNITS (Sheet 30 of 54)

FILL WATER TANK ON 220-L/min (58-gal/min) UNIT (Cont'd)

- ___ 8. Check alkalinity of water in water cooling unit, using water treatment pH indicator kit (figure 3-30) as follows:
- ___ a. Drain small amount of water from water tank drain valve into clean container. Pour some water from container into both color viewing tubes. Rinse tubes thoroughly and leave them empty.

WARNING

The chemicals in the wide range 4 pH indicator solution may be hazardous to the health and safety of the user if inappropriately handled. Read all warnings included with the test kit before using it.

- ___ b. Pour additional water from container into both color viewing tubes, filling tubes only to their 5-mL marks.
- ___ c. Add six drops of wide range 4 pH indicator solution to one sample tube. Cover tube with stopper, and swirl it to mix solution with water sample.
- ___ d. Insert tube with treated water into right opening of color comparator.
- ___ e. Insert tube with untreated water sample into left opening of color comparator.
- ___ f. Hold color comparator up to light source and view color comparator openings. Rotate color disc by turning its edge to obtain color match in openings.
- ___ g. Read pH indicator on front of color comparator. Correct alkalinity (pH) indication is between 7.0 and 8.5.

If pH is more than 8.5, dilute water in water cooling unit as follows:

- ___ 1) Drain 3.8 L (1-gal) of water from water cooling unit.
- ___ 2) Add 3.8 L (1-gal) of untreated distilled water to water cooling unit.
- ___ 3) Wait 15-min and repeat this entire step to ensure correct pH level between 7.0 and 8.5.

If pH is less than 7.0 increase pH level as follows:

- ___ 1) Put on safety glasses and disposable rubber or plastic gloves.

PREPARING WATER COOLING UNITS (Sheet 31 of 54)

FILL WATER TANK ON 220-L/min (58-gal/min) UNIT (Cont'd)

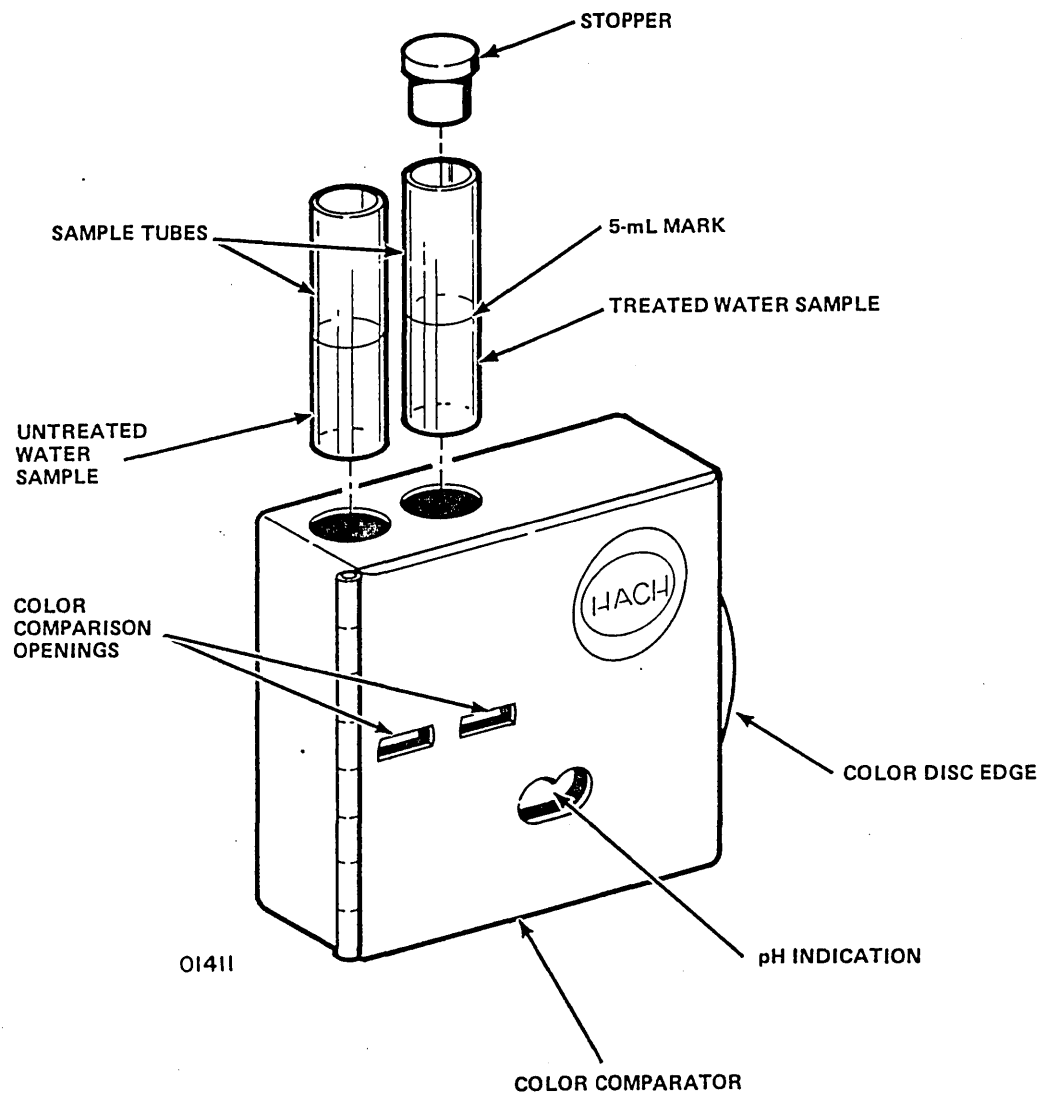


Figure 3-30. Water Treatment pH Indicator Kit

PREPARING WATER COOLING UNITS (Sheet 32 of 54)

FILL WATER TANK ON 220-L/min (58-gal/min) UNIT (Cont'd)

WARNING

Do not inhale vapors from Cobratec or allow it to contact skin or eyes. Cobratec contains a sodium hydroxide solution, which can severely burn skin and eyes and cause harm if a large quantity is inhaled.

- ___ 2) Add one drop of Cobratec corrosion inhibitor to each 3.8 L (1 gal) of water in water tank. Cobratec has an indefinite shelf life.
- ___ 3) Wait 15-min and repeat this entire step to ensure correct pH level between 7.0 and 8.5
- ___ 9. Rinse and store sample tubes in color comparator.
- ___ 10. Leave safety glasses and gloves on.

WARNING

Do not inhale vapors from biocide chemical microorganism control or allow it to contact skin or eyes. The chemical microorganism control contains polyoxyethylene (dimethyliminio) ethylene (dimethyliminio) ethylene dichloride, a substance that can cause severe eye and skin irritation.

- ___ 11. Wait at least 15 min after adding Cobratec (step 12). Then add 4 drops of biocide chemical microorganism control to each 3.8 L (1 gal) of water in water tank. Note expiration date on biocide container to ensure its usability.
- ___ 12. Remove safety glasses and gloves.

PREPARING WATER COOLING UNITS (Sheet 33 of 54)

BLEED AIR FROM 220-L/min (58-gal/min) UNIT

Use this procedure to release any trapped air from chassis (distilled) water in the 220-L/min (58-gal/min) water cooling unit.

Procedure prerequisite:

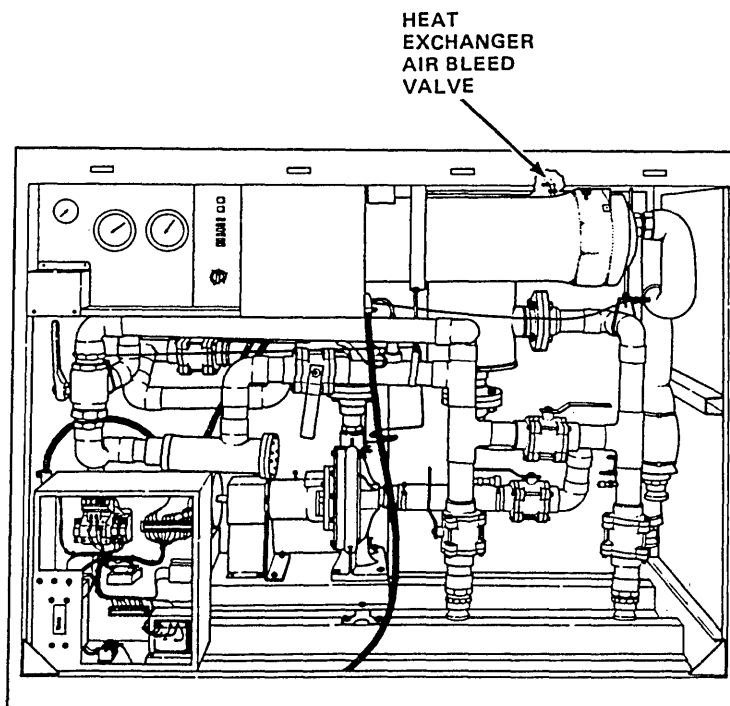
- Water cooling unit is operating.

Material required:

- Paper tissues or cloth towel for absorbing water

Procedure:

- ___ 1. Open site (customer) water supply and return valves to water cooling unit.
- ___ 2. Place paper tissues or towel around heat exchanger air bleed valve (figure 3-31) to absorb water.
- ___ 3. Open air bleed valve slightly until air escapes and water begins coming out.
- ___ 4. Remove towel or tissues.
- ___ 5. Allow water cooling unit to operate several hours, permitting air to escape from chassis water before installing fill plug on top of water cooling unit water tank.



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Figure 3-31. Air Bleed Valve on 220-L/min (58-gal/min) Unit

PREPARING WATER COOLING UNITS (Sheet 34 of 54)

ADJUST WATER FLOW RATES TO CP, CM, AND IOU

Use the following procedures to adjust the water manifold flow rates to the CP-0, CP-1, CM, IOU NIO cabinet, IOU CIO cabinet, and water cooling units.

Procedure prerequisite:

- The water cooling unit is operating.

Parts required:

- Distilled water, as required to maintain water level in water cooling unit
- Funnel
- Water tank drain hose
- Empty water container, 4 L to 8 L (1 gal to 2 gal)

Procedure:

- ___ 1. Remove floor tiles above return water manifolds.
- ___ 2. Remove flow meter covers (figure 3-32) by pulling them upward and off.
- ___ 3. Set flow meters on water return manifolds by turning valve adjust handles to obtain following rates. Turning flow meter valve handles counterclockwise increases water flow rate.

NOTE

The following flow rates are minimum. They may be somewhat higher when 60-Hz voltage is connected to the water cooler but should be as close as possible to the rates shown for a 50-Hz voltage connection.

- ___ a. CP-0 and CP-1 column 1 flow meters to 11.3 L (3 gal) per min.
- ___ b. CP-0 and CP-1 column 2 flow meters to 11.3 L (3 gal) per min.
- ___ c. CP-0 and CP-1 column 3 flow meters to 15.1 L (4 gal) per min.
- ___ d. CM flow meter to 7.6 L (2 gal) per min.
- ___ e. IOU NIO cabinet flow meter to 15.1 L (4 gal) per min.
- ___ f. IOU CIO cabinet flow meter to 15.1 L (4 gal) per min.

PREPARING WATER COOLING UNITS (Sheet 35 of 54)

ADJUST WATER FLOW RATES TO CP, CM, AND IOU (Cont'd)

FLOW METER DETAIL

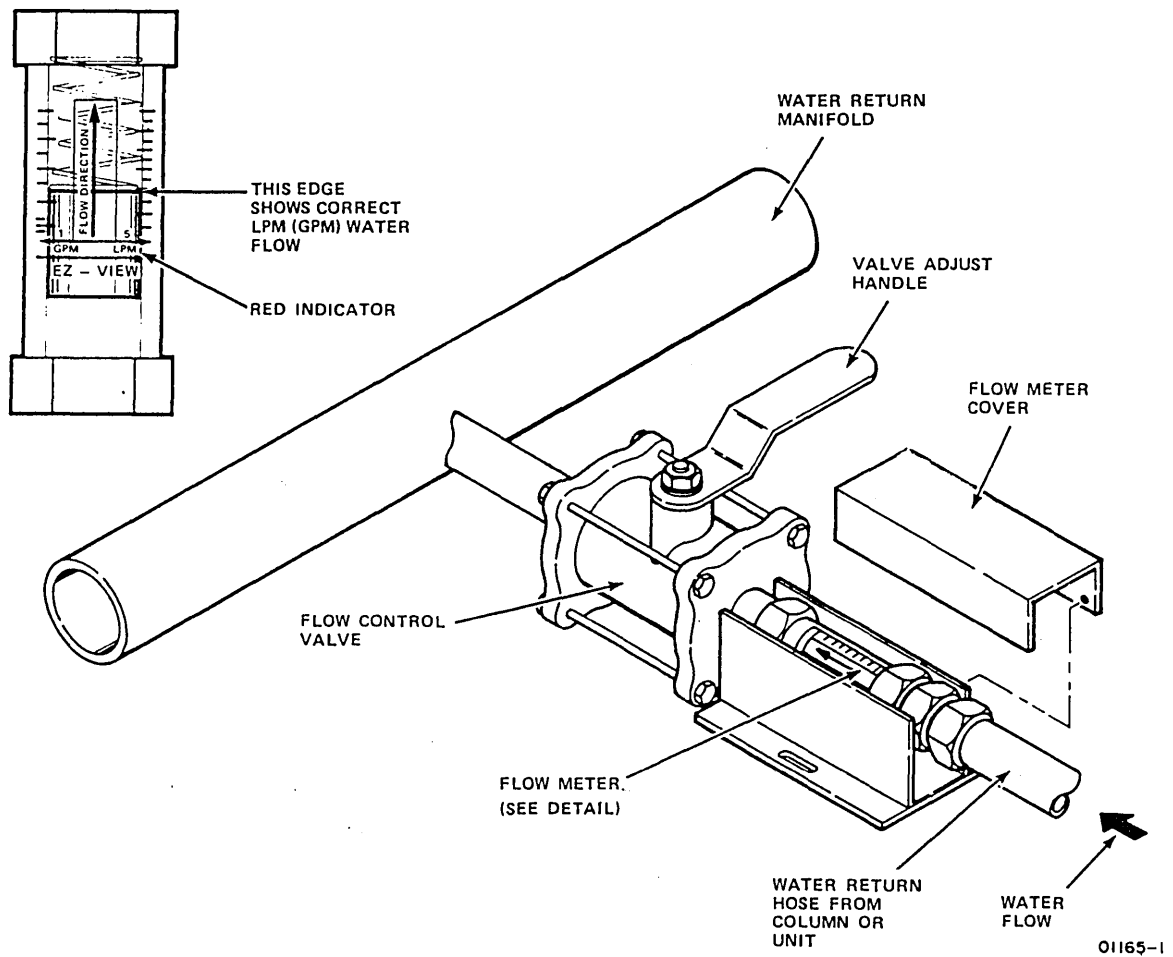


Figure 3-32. CP Column and CM Water Flow Meters and Valve Adjust Handles

PREPARING WATER COOLING UNITS (Sheet 36 of 54)

ADJUST WATER FLOW RATES TO CP, CM, AND IOU (Cont'd)

- ___ 4. Repeat step 3 until all flow rates are adjusted correctly.
- ___ 5. Check PUMP OUTLET PRESSURE gauge on water cooling unit to ensure that it reads between 75 and 92 psi. To obtain this reading, adjust bypass valve on water cooling unit.
- ___ 6. Repeat step 3 until all flow rates are adjusted correctly.
- ___ 7. Do not install flow meter covers until after a later recheck of flow rates.
- ___ 8. Visually check water level at water cooling unit sight glass.

If water level in sight glass does not indicate three-fourths full, proceed to step 9.

If water level in sight glass indicates three-fourths full, proceed to step 10.

- ___ 9. Use funnel to add distilled water to water tank, as necessary, until water level in sight glass indicates three-fourths full.

If water pump motor stops operating and HIGH WATER LEVEL indicator on power disconnect box lights, perform the following tasks:

- ___ a. Set INPUT POWER DISCONNECT switch on rear of water cooling unit to OFF.
- ___ b. Attach drain hose to water tank drain valve. Place opposite end of drain hose in an empty water container.
- ___ c. Open water tank drain valve and drain water into container until sight glass indicates three-fourths full.
- ___ d. Close drain valve.
- ___ e. Set INPUT POWER DISCONNECT switch to ON.
- ___ f. Repeat steps 6 and 7 until water level in sight glass remains at three-fourths full.
- ___ g. Remove drain hose and container.

- ___ 10. Install floor tiles.

IS OPTIONAL CP-1 PART OF INSTALLATION?

- If yes, repeat this procedure for CP-1 columns.
- If no, go to next procedure.

PREPARING WATER COOLING UNITS (Sheet 37 of 54)

CHECK WATER COOLING UNIT TEMPERATURE, PRESSURE, AND FLOW

Use this procedure to verify that the water cooling unit temperature, pressure, and flow rate are within specifications.

Procedure prerequisite:

- The water cooling unit must have been operating for a minimum of 15 min.

Procedure:

- ___ 1. Read PUMP OUTLET PRESSURE gauge (figure 3-33). Adjust bypass valve, if necessary, to obtain following pressure:
 - ___ a. For 60-Hz power, 483 kPa to 566 kPa (70 psi to 82 psi).
 - ___ b. For 50-Hz power, 276 kPa to 414 kPa (40 psi to 60 psi).
- ___ 2. If pump outlet pressure gauge fluctuates rapidly, bleed air from gauge by loosening nut beneath gauge. Then retighten nut.
- ___ 3. Read CHASSIS WATER TEMPERATURE gauge. Verify gauge indicates between 16.7 °C and 21.5 °C (62 °F and 65 °F), 18.3 °C (63 °F) nominal. If gauge does not indicate a temperature within this range, turn TEMPERATURE CONTROL knob counterclockwise to decrease temperature or clockwise to increase temperature. Wait 15 min for temperature change to register accurately on gauge.
- ___ 4. Read CHILLED WATER TEMPERATURE gauge. Verify that gauge indicates between 4.4 °C and 10.0 °C (40 °F and 50 °F).

NOTE

The following step is necessary because of interaction between the pump pressure and the water flow rates.

- ___ 5. Repeat this and previous procedure until water cooling unit temperature, pressure, and flow gauge readings are correct.

PREPARING WATER COOLING UNITS (Sheet 38 of 54)

CHECK WATER COOLING UNIT TEMPERATURE, PRESSURE, AND FLOW (Cont'd)

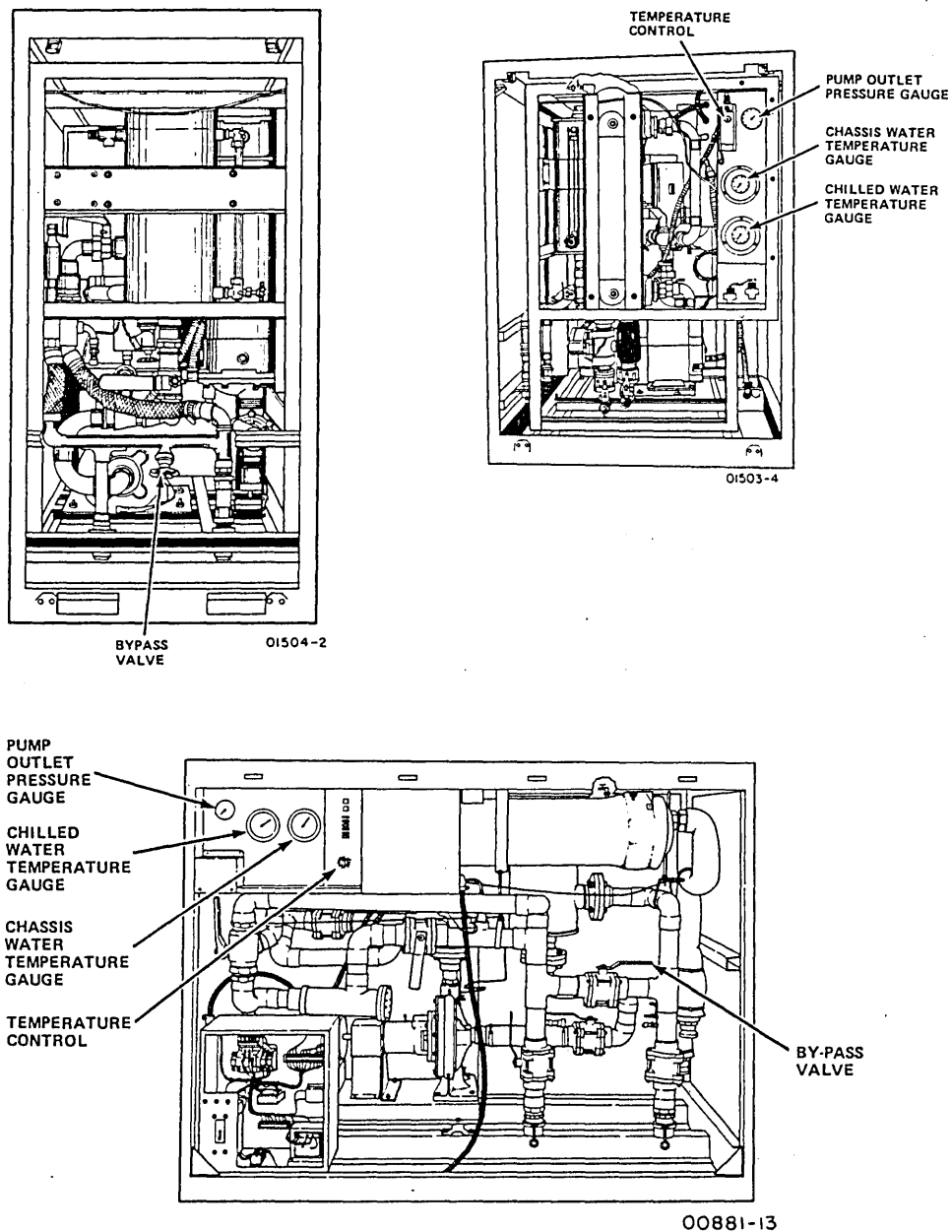


Figure 3-33. Water Cooling Unit Temperature, Pressure, and Flow Rate Meters

PPREPARING WATER COOLING UNITS (Sheet 39 of 54)

CHECK SITE WATER FLOW RATE

Use the following procedure to verify the correct water flow rates in the site supply lines to the water cooling units.

Tools required:

- Differential pressure gauge
- 1/2-in wrench
- Water container, 2 L (1/2 gal)

Procedure:

- ___ 1. Prepare differential pressure gauge (figure 3-34) for checking site flow rate as follows:
 - ___ a. Place differential pressure gauge with dial face vertical.
 - ___ b. Open high- and low-pressure vent valves. If gauge needle does not indicate 0, mechanically set gauge needle as follows:
 - ___ 1) Remove three screws from gauge cover, using a slotted screwdriver.
 - ___ 2) Remove gauge cover and glass assembly.
 - ___ 3) Hold zero adjustment screw in center of pointer with slotted screwdriver while turning pointer to 0 on gauge dial.
 - ___ 4) Replace cover, glass assembly, and mounting screws.
 - ___ c. Close high- and low-pressure vent valves.
 - ___ d. Open bypass valve by turning it counterclockwise.
 - ___ e. Close high- and low-pressure block valves by turning them clockwise.
 - ___ f. Attach hoses provided with differential pressure gauge to high- and low-pressure hose taps on gauge. Tighten hoses with 1/2-in wrench.
- ___ 2. Check site water flow rate as follows:
 - ___ a. Access venturi flow meter.

For the 102-L/min (27-gal/min) water cooling unit, the venturi flow meter is on the site water return line under the floor tiles. This flow meter requires removal of a protective cover.

For the 220-L/min (58-gal/min) water cooling unit, the venturi flow meter is on the site water return line inside the water cooling unit.

PREPARING WATER COOLING UNITS (Sheet 40 of 54)

CHECK SITE WATER FLOW RATE (Cont'd)

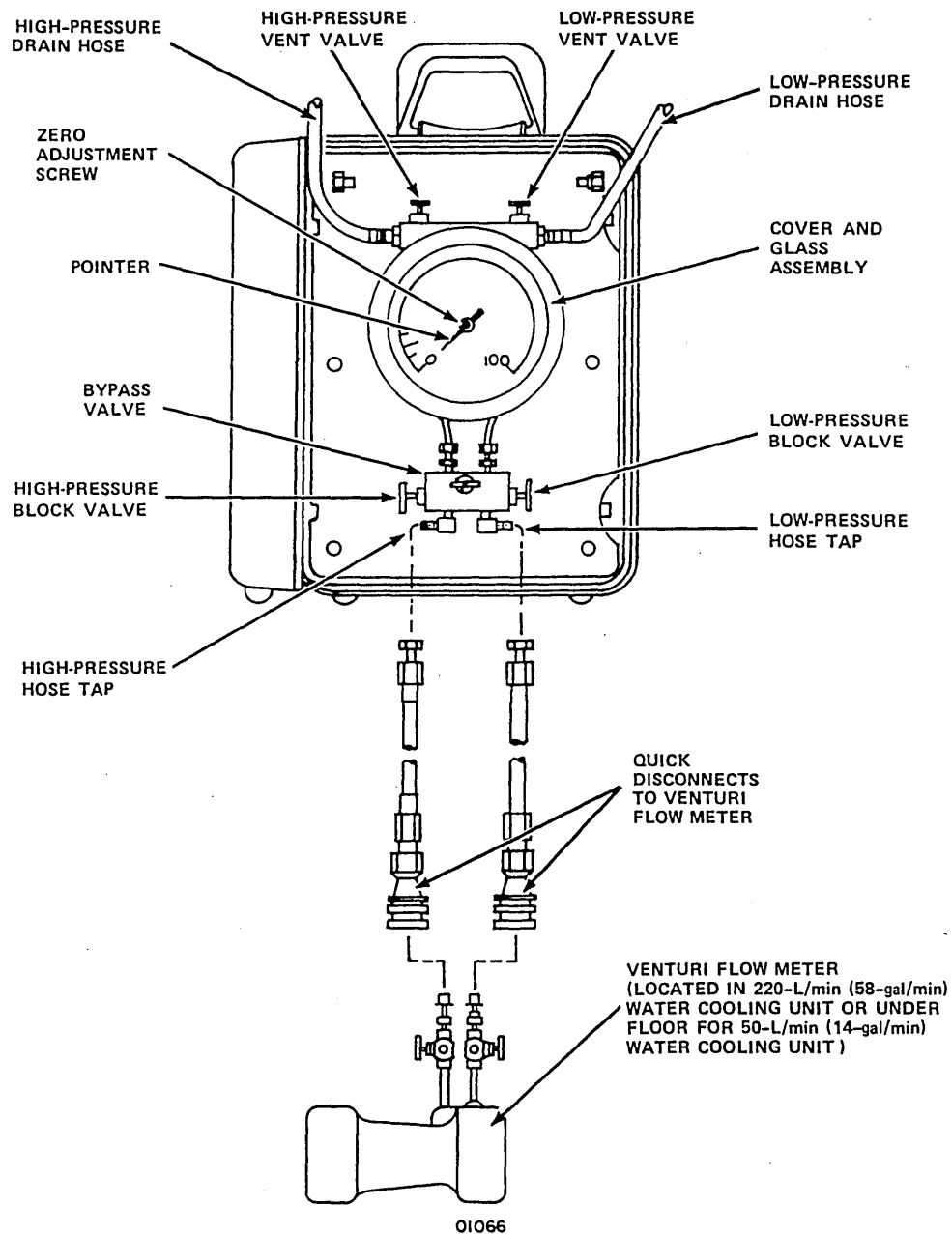


Figure 3-34. Differential Pressure Gauge

PREPARING WATER COOLING UNITS (Sheet 41 of 54)

CHECK SITE WATER FLOW RATE (Cont'd)

- ___ b. Ensure that venturi valves are closed (turned clockwise).

CAUTION

Hoses must be correctly connected between differential pressure gauge and venturi flow meter to prevent damage to gauge.

- ___ c. Connect hoses on differential pressure gauge to quick disconnects on venturi flow meter according to color coding on hoses and venturi flow meter.
- ___ d. Open valves on venturi flow meter so that water flows into differential pressure gauge.
- ___ e. Place high- and low-pressure drain hoses in water container.
- ___ f. Open high- and low-pressure block valves on differential pressure gauge.
- ___ g. Partially open high- and low-pressure vent valves until draining water no longer contains air bubbles.
- ___ h. Close high- and low-pressure vent and block valves; leave bypass valve open. If pointer indicates 0, continue with procedure. If pointer does not indicate 0, system contains trapped air. Alternately open high- and low-pressure block valves to relieve air and allow pointer to indicate 0.
- ___ i. Open high- and low-pressure block valves.
- ___ j. Close bypass valve.
- ___ 3. Read differential pressure gauge. Gauge indicates flow rate in inches of water.
- ___ 4. Use calibration chart (figure 3-35) or chart connected to venturi flow meter to convert inches of water to gal/min as follows:
 - ___ a. Look at markings on venturi flow meter to determine flow meter type.
 - For a 102-L/min (27-gal/min) water cooling unit, the flow meter markings are 1-1/2" - 563.
 - For a 220-L/min (58-gal/min) water cooling unit, the flow meter markings are 2" - 636.
 - ___ b. Refer to INCHES OF WATER Δ P column at left of chart, and locate reading taken in step 3.
 - ___ c. Follow across chart to slanted line corresponding to flow meter type. The number directly below this point in bottom row on chart is flow rate in gal/min.

PREPARING WATER COOLING UNITS (Sheet 42 of 54)

CHECK SITE WATER FLOW RATE (Cont'd)

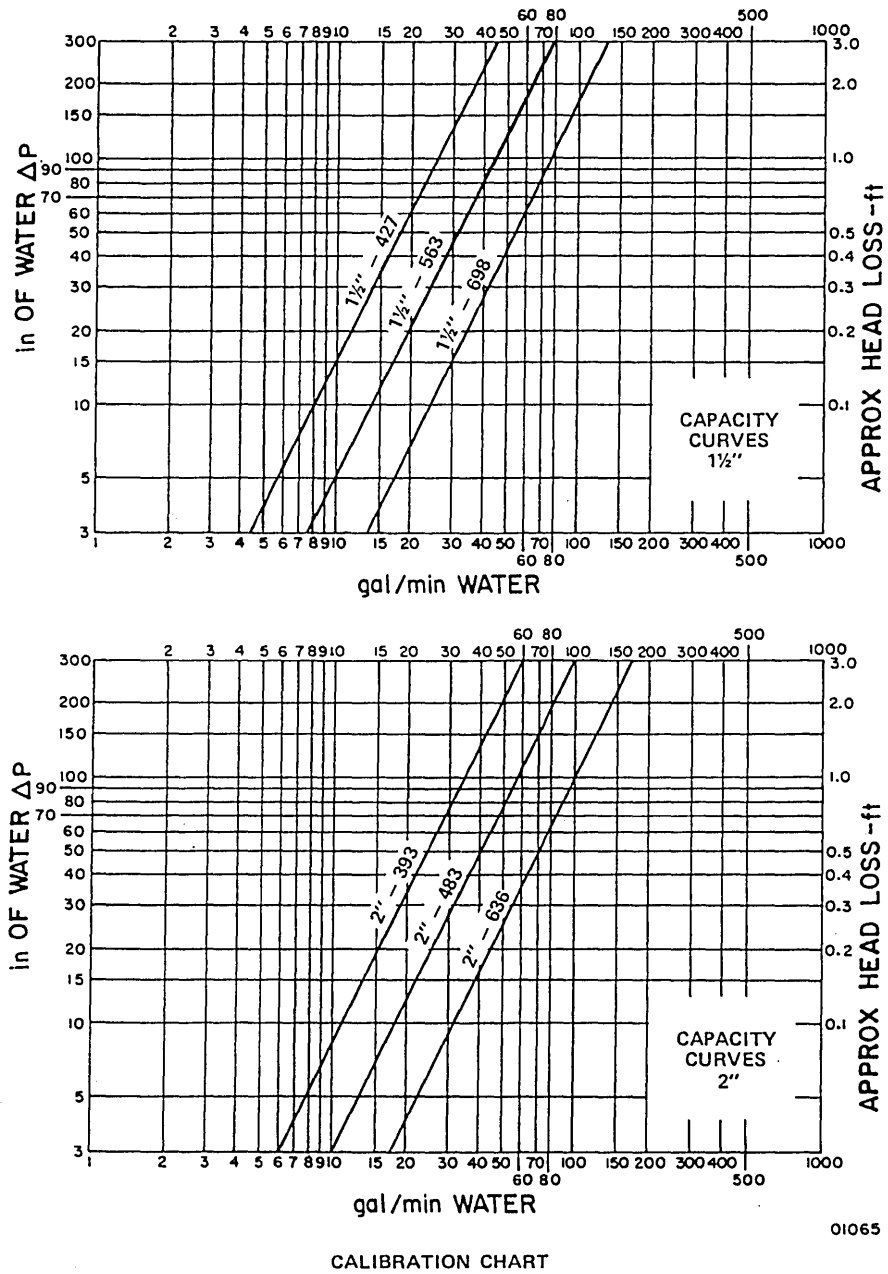


Figure 3-35. Water Flow Calibration Charts

PREPARING WATER COOLING UNITS (Sheet 43 of 54)

CHECK SITE WATER FLOW RATE (Cont'd)

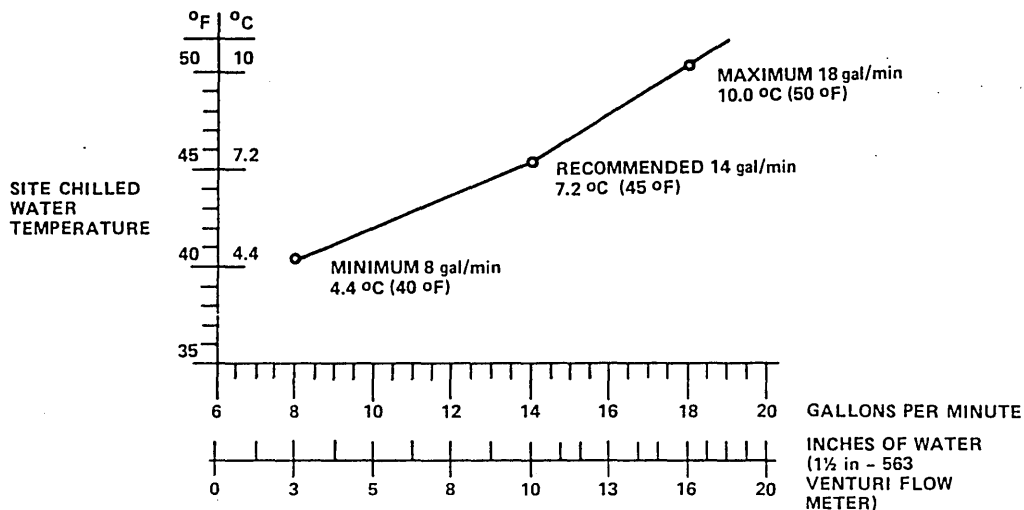
- ___ 5. Observe reading on CHILLED WATER TEMPERATURE gauge on water cooling unit.
- ___ 6. Use flow rate (determined in step 4) and chilled water temperature (read in step 5) with appropriate chart in figure 3-36 to determine whether flow rate is within acceptable limits.
- ___ 7. Adjust flow rate, if necessary, to obtain correct flow rate for water temperature.
 - For a 102-L/min (27-gal/min) water cooling unit, adjust three-way valve on site water supply hose assembly under raised floor.
 - For a 220-L/min (58-gal/min) water cooling unit, adjust flow control valve on site water line within water cooling unit.

If flow rate cannot be properly adjusted, inform customer that site water needs flow/temperature correction.

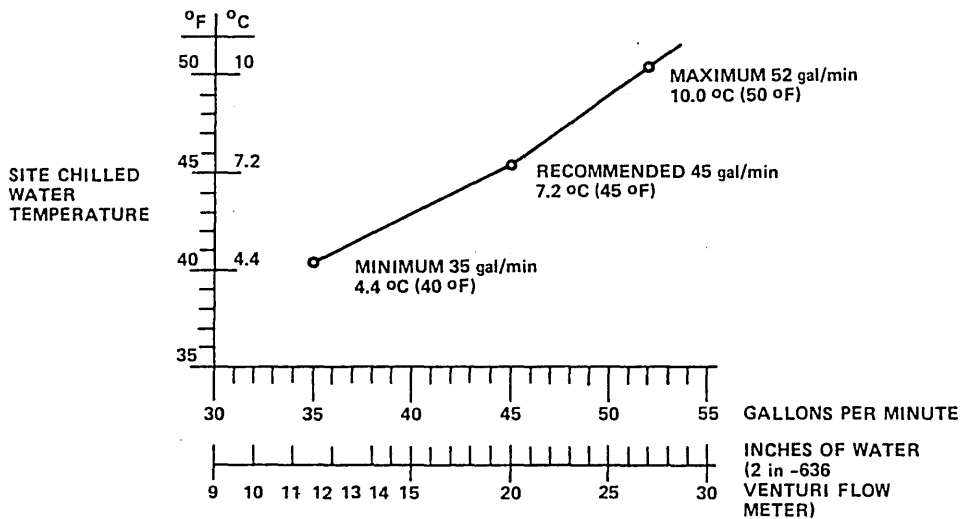
PREPARING WATER COOLING UNITS (Sheet 44 of 54)

CHECK SITE WATER FLOW RATE (Cont'd)

102-L/min (27-gal/min) WATER COOLING UNIT WATER FLOW RATES



220-L/min (58-gal/min) WATER COOLING UNIT WATER FLOW RATES



NOTES:

1. THE MAXIMUM TEMPERATURE RATE OF CHANGE IS 1.1 °C/min (2 °F/min).
2. THE MAXIMUM FLOW RATE OF CHANGE IS 3.8 L/min (1 gal/min).

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Figure 3-36. Site Water Flow Rate Charts

PREPARING WATER COOLING UNITS (Sheet 45 of 54)

CHECK SITE WATER FLOW RATE (Cont'd)

- ___ 8. Observe water mixing valve indicator on valve linkage housing assembly in water cooling unit (figure 3-37). If indicator is not within upper and lower operating limits shown in figure, select following applicable procedure and perform its substeps.

If position of mixing valve indicator is higher than high limit shown in figure, perform these tasks:

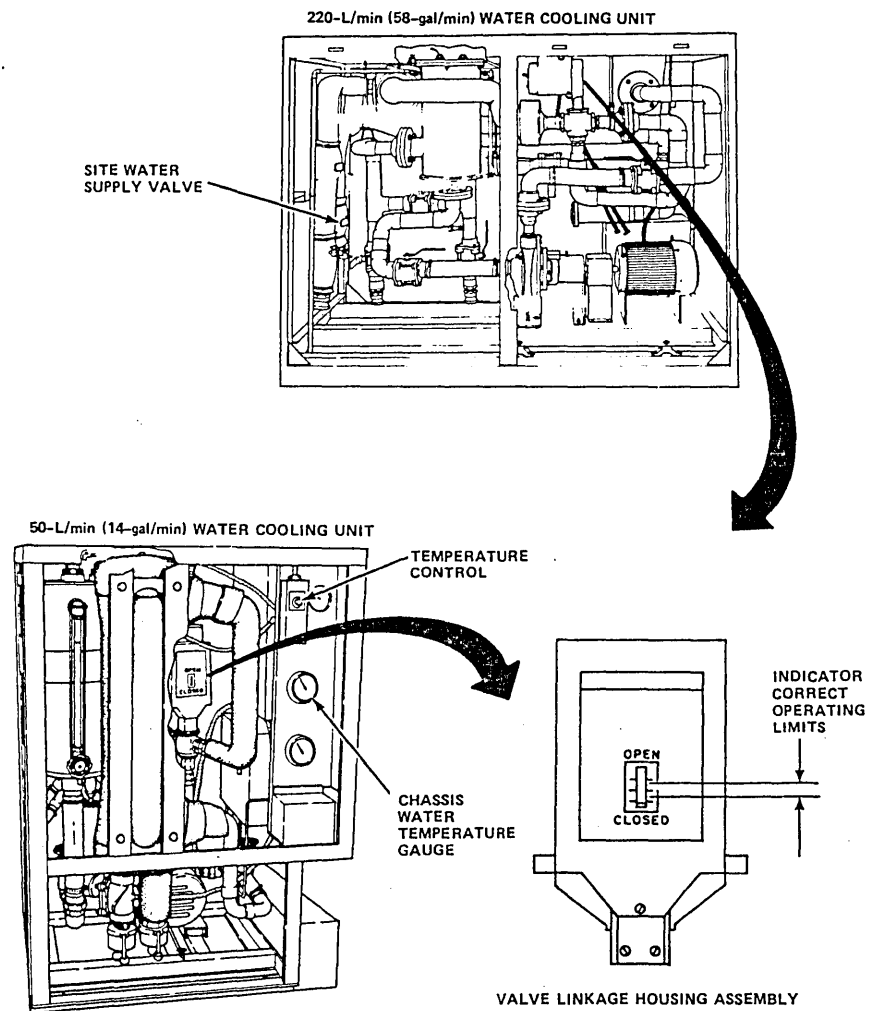
- ___ a. Decrease site water flow slightly so that mixing valve indicator is positioned midway between OPEN and CLOSED on housing assembly. Do this as follows:
- For 220-L/min (58-gal/min) water cooling unit, adjust site water supply valve on water cooling unit.
 - For 102-L/min (27-gal/min) water cooling unit, adjust three-way valve on supply hose assembly under raised floor.
- ___ b. Wait 1/2 hr for water temperature to stabilize. Then observe water temperature gauge on water cooling unit. Adjust temperature control on water cooling unit, if necessary, to maintain a nominal 17.2 °C (63 °F) temperature.
- ___ c. Note also that a slight opening or closing of water cooling unit chassis bypass valve may help correct mixing valve indicator position. If this adjustment is made, all CP column flow rates must be checked and reset to their original values as follows:
- CP-0 and CP-1 column 1 flow meters to 11.3 L (3 gal) per min.
 - CP-0 and CP-1 column 2 flow meters to 11.3 L (3 gal) per min.
 - CP-0 and CP-1 column 3 flow meters to 15.1 L (4 gal) per min.
 - CM flow meter to 7.6 L (2 gal) per min.
 - IOU NIO cabinet flow meter to 15.1 L (4 gal) per min.
 - IOU GIO cabinet flow meter to 15.1 L (4 gal) per min.
- ___ d. Repeat these adjustments as necessary to position mixing valve indicator correctly.

If position of mixing valve indicator is lower than low limit shown in figure, perform the following tasks:

- ___ a. Increase site water flow slightly so that mixing valve indicator is positioned midway between OPEN and CLOSED on housing assembly. Do this as follows:
- For 102-L/min (27-gal/min) water cooling unit, adjust three-way valve on supply hose assembly under raised floor.
 - For 220-L/min (58-gal/min) water cooling unit, adjust site water supply valve on water cooling unit.

PREPARING WATER COOLING UNITS (Sheet 46 of 54)

CHECK SITE WATER FLOW RATE (Cont'd)



NOTE:
TEMPERATURE CONTROL AND CHASSIS WATER TEMPERATURE GAUGE ARE ON FRONT
CONTROL PANEL (NOT SHOWN) OF 220-L/min (58-gal/min) WATER COOLING UNIT.

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Figure 3-37. Water Cooling Unit Mixing Valve Indicator

PREPARING WATER COOLING UNITS (Sheet 47 of 54)

CHECK SITE WATER FLOW RATE (Cont'd)

- ___ b. Wait 1/2 hr for water temperature to stabilize. Then observe water temperature gauge on water cooling unit. Adjust temperature control on water cooling unit, if necessary to maintain a nominal 17.2 °C (63 °F) temperature.
- ___ c. Note also that a slight opening or closing of water cooling unit chassis bypass valve may help obtain correct indicator position. If this adjustment is made, all CP column flow rates must be checked and reset to their original values as follows:
 - CP-0 and CP-1 column 1 flow meters to 11.3 L (3 gal) per min.
 - CP-0 and CP-1 column 2 flow meters to 11.3 L (3 gal) per min.
 - CP-0 and CP-1 column 3 flow meters to 15.1 L (4 gal) per min.
 - CM flow meter to 7.6 L (2 gal) per min.
 - IOU NIO cabinet flow meter to 15.1 L (4 gal) per min.
 - IOU CIO cabinet flow meter to 15.1 L (4 gal) per min.
- ___ d. Repeat these adjustments as necessary to position mixing valve indicator correctly.

If mixing valve indicator modulates (hunts) outside of limits shown in figure 3-37, perform these tasks:

NOTE

Modulation of mixing valve within limits shown in figure is an acceptable condition.

- ___ a. Check customer-supplied site water for following requirements:

Maximum temperature rate of change is 1.1 °C/min (2 °F/min), as observed on water cooling unit temperature gauge.

Maximum flow rate of change is 3.8 L/min (1 gal/min), as observed on differential pressure gauge.

If site water does not meet either or both of these conditions, request that customer make corrective adjustments.

When (and only when) both temperature and flow rates of site water are within requirements, continue following substeps.

PREPARING WATER COOLING UNITS (Sheet 48 of 54)

CHECK SITE WATER FLOW RATE (Cont'd)

- ___ b. Open or close water cooling unit chassis bypass valve slightly, as required, to stop or limit modulation of mixing valve indicator. Following this adjustment, check all CP column flow rates and reset them to their original values as follows:

CP-0 and CP-1 column 1 flow meters to 11.3 L (3 gal) per min.

CP-0 and CP-1 column 2 flow meters to 11.3 L (3 gal) per min.

CP-0 and CP-1 column 3 flow meters to 15.1 L (4 gal) per min.

CM flow meter to 7.6 L (2 gal) per min.

IOU NIO cabinet flow meter to 15.1 L (4 gal) per min.

IOU CIO cabinet flow meter to 15.1 L (4 gal) per min.

- ___ c. Wait 1/2 hr for water temperature to stabilize. Then observe water temperature gauge on water cooling unit. Adjust temperature control on water cooling unit, if necessary, to maintain a nominal 17.2 °C (63 °F) temperature.

- ___ d. Repeat these adjustments as necessary to position mixing valve indicator correctly.

- ___ 9. Open bypass valve on differential pressure gauge.

- ___ 10. Close venturi flow meter valves, and disconnect differential pressure gauge hoses from flow meter.

- ___ 11. Open high- and low-pressure vent valves on differential pressure gauge.

CAUTION

Drain water from gauge and hoses to prevent damage caused by freezing temperatures that may occur during transporting of gauge.

- ___ 12. Disconnect hoses from differential pressure gauge and venturi flow meter.

- ___ a. Hold high-pressure hose quick-disconnect end; let nut end dangle into water container.
- ___ b. Use screwdriver or some other instrument to depress valve in center of quick disconnect to allow water to drain from hose.
- ___ c. Repeat substeps a and b for low-pressure hose.

PREPARING WATER COOLING UNITS (Sheet 49 of 54)

CHECK SITE WATER FLOW RATE (Cont'd)

- ___ 13. Close bypass valve.
- ___ 14. Place water container under high- and low-pressure hose taps.
- ___ 15. Open high-pressure vent valve.
- ___ 16. Blow into high-pressure drain hose to force water out at low-pressure hose tap.
- ___ 17. Open low-pressure vent valve.
- ___ 18. Blow into low-pressure drain hose to force water out at low-pressure hose tap.
- ___ 19. Repeat this procedure for second water cooling unit, if present for cooling optional CP-1.
- ___ 20. Replace protective cover on venturi flow meter. This applies to checks for 102-L/min (27-gal/min) water cooling unit only.
- ___ 21. Install floor tiles, if removed.

PREPARING WATER COOLING UNITS (Sheet 50 of 54)

BLEED AIR FROM CP

Use this procedure to bleed trapped air from the CP-0 and CP-1 columns.

DOES A HIGH-TEMPERATURE CONDITION EXIST FOR CP-0 OR CP-1?

- If yes, continue with this procedure.
- If no, go to next procedure.

Procedure prerequisite:

- The water cooling unit is operating.

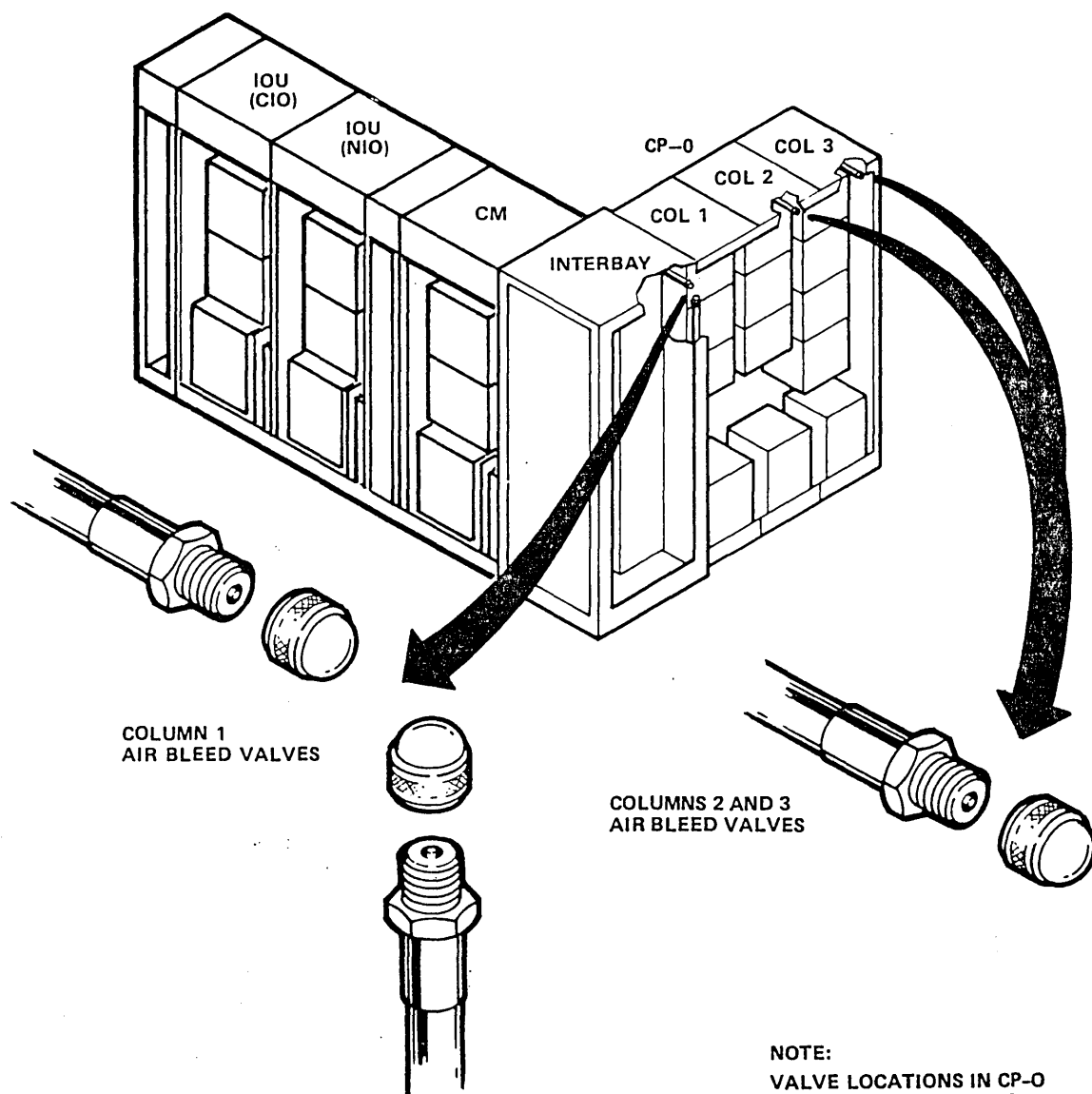
Tools and parts required:

- Paper tissues or towel for absorbing water
- Small screwdriver
- Water tank drain hose
- Empty water container to hold 4 L to 8 L (1 gal to 2 gal)

Procedure:

- ___ 1. Unscrew and remove end cap from bleed valve at top of CP-0 column 1 (figure 3-38).
- ___ 2. Place a tissue or towel around valve to absorb bleed water in next step.
- ___ 3. Press compressible needle in center of valve with small tool, such as screwdriver, until air escapes and water bleeds from valve orifice. Release valve. Bleed valve is similiar to an auto tire air valve.
- ___ 4. Add water to or drain it from water cooling unit tank if following conditions exist.
 - Water level in sight glass does not indicate three-fourths full.
 - Water pump motor stops operating while bleeding air, and LOW WATER LEVEL indicator on power disconnect box lights. Set INPUT POWER DISCONNECT switch on water cooling unit to OFF, add water, and restart pump motor.
 - Water pump motor stops operating, and HIGH WATER LEVEL indicator on power disconnect box lights. If this condition exists, perform the following steps:
 - ___ a. Set INPUT POWER DISCONNECT switch on water cooling unit to OFF.
 - ___ b. Attach drain hose to water tank drain valve, and place hose in empty water container.

BLEED AIR FROM CP (Cont'd)



01305R-1

Figure 3-38. CP Columns Air Bleed Valve Locations

PREPARING WATER COOLING UNITS (Sheet 52 of 54)

BLEED AIR FROM CP (Cont'd)

- ☐ c. Open water tank drain valve, and drain water into container until sight glass indicates three-fourths full.
 - ☐ d. Close drain valve. Remove drain hose and container.
 - ☐ e. Restart pump motor.
- ☐ 5. Repeat steps 1 through 4 for CP-0 column 2.
- ☐ 6. Repeat steps 1 through 4 for CP-0 column 3.
- ☐ 7. Repeat procedure for optional CP-1.
- ☐ 8. Record time on flowchart for preparing water cooling unit(s).

PREPARING WATER COOLING UNITS (Sheet 53 of 54)

BLEED AIR FROM IOU

- ___ 1. Hold paper tissues or towel under bleed valve in NIO section of IOU (figure 3-39).
- ___ 2. Open valve slowly and allow air to escape. When water begins to come out, shut valve.
- ___ 3. Remove paper tissues or towel.
- ___ 4. Add water, as necessary, to maintain water level at three-fourths full in sight glass.
 - If water pump motor stops operating while bleeding air, and LOW WATER LEVEL indicator on power disconnect box lights, set INPUT POWER DISCONNECT switch on water cooling unit to OFF, add water and restart pump motor.
 - If water pump motor stops operating and HIGH WATER LEVEL indicator on power disconnect box lights:
 - ___ a. Set INPUT POWER DISCONNECT switch on water cooling unit to OFF.
 - ___ b. Attach drain hose to water tank drain valve and place hose in empty water container.
 - ___ c. Open water tank drain valve and drain water into container until sight glass indicates three-fourths full.
 - ___ d. Close drain valve.
 - ___ e. Remove drain hose and container.
 - ___ f. Restart pump motor.
- ___ 5. Repeat this procedure for optional IOU CIO cabinet.

PREPARING WATER COOLING UNITS (Sheet 54 of 54)

BLEED AIR FROM IOU (Cont'd)

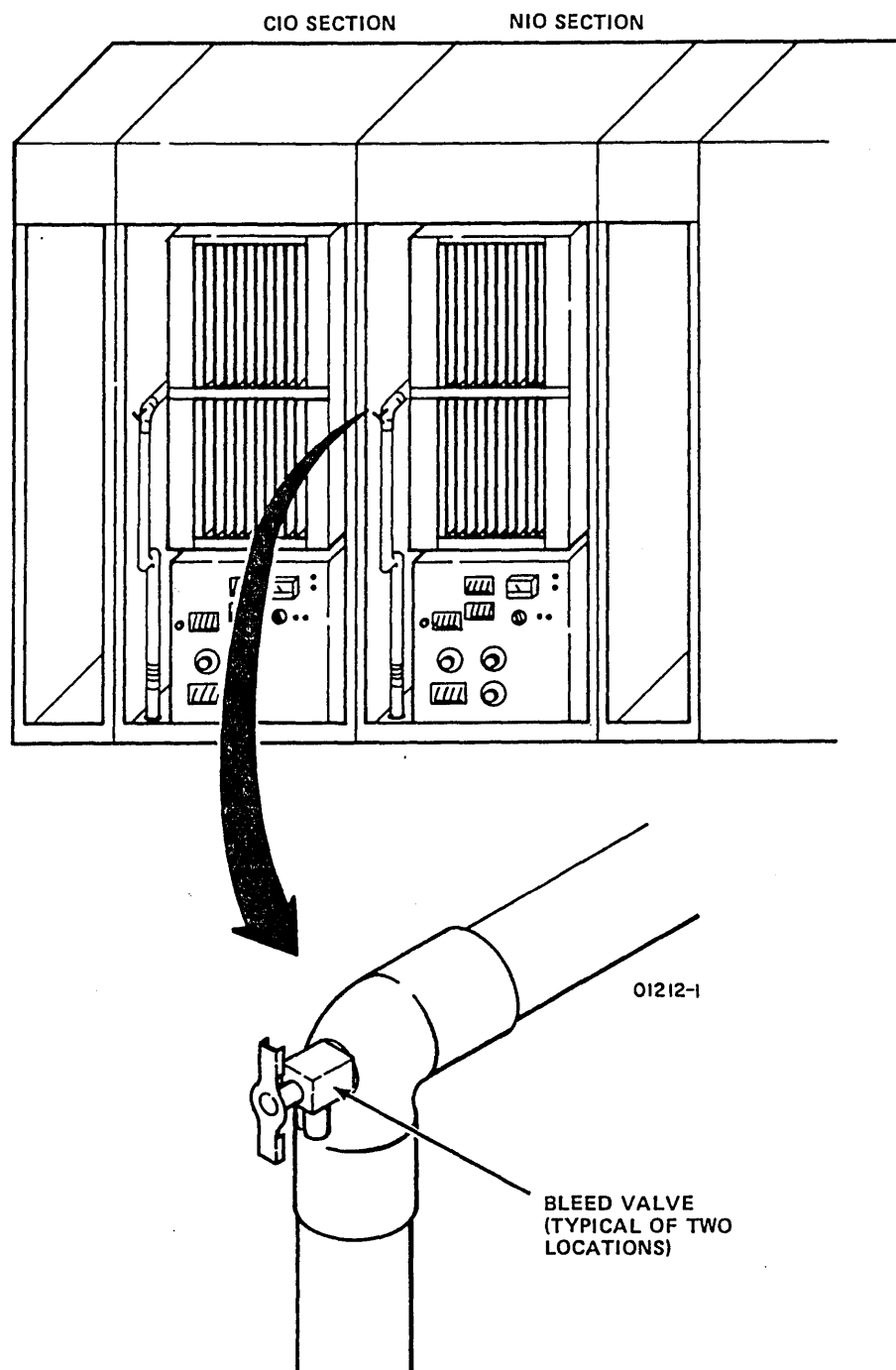


Figure 3-39. IOU Air Bleed Valve Locations

APPLYING SYSTEM POWER (Sheet 1 of 32)

Applying system power consists of starting the M-G set and water cooling unit(s) from the system power monitor (SPM), turning on power to the central processor cabinets, and adjusting cabinet voltages as described in the following procedures:

WARNING

In case of a personnel or equipment emergency, a SYSTEM EMERGENCY switch on the front of the interbay may be used to remove system power.

NOTE

Perform the following procedures with installer 1.

- Apply M-G set power from SPM.
- Apply power and adjust voltages for IOU NIO cabinet.
- Apply power and adjust voltages for IOU optional CIO cabinet.
- Apply power and adjust voltages for CP-0 and optional CP-1.
- Apply power and adjust voltages for CM.
- Rechecking water flow rates.

APPLYING SYSTEM POWER (Sheet 2 of 32)

APPLY M-G SET POWER FROM SPM

Use this procedure to start the M-G set power from the controls on the system power monitor (SPM).

Procedure prerequisites:

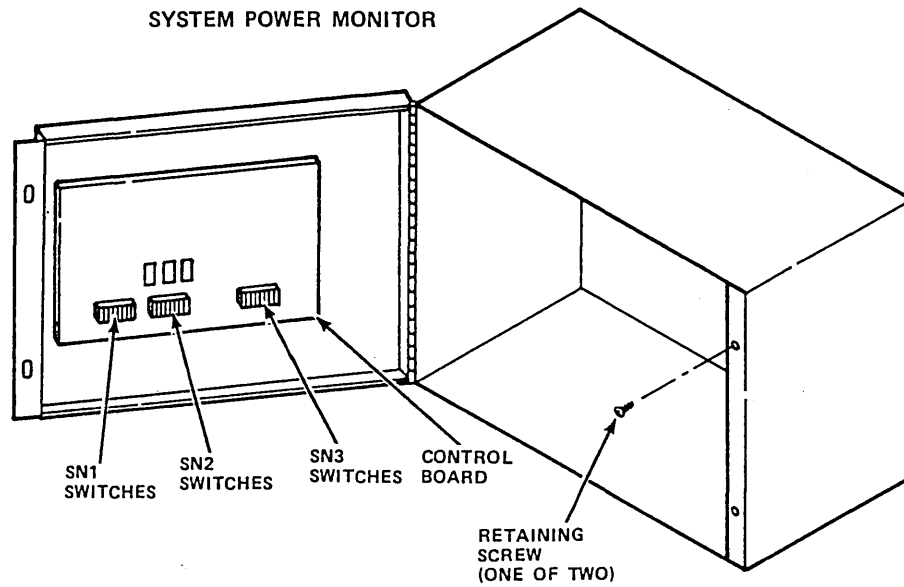
- M-G set power was previously checked out and run in the local mode of operation. M-G set is set for remote operation.
- M-G set output voltages were previously adjusted.
- All wall-mounted disconnect boxes that control power from the M-G set to the computer system are set to OFF.
- Switch groups SN1, SN2, and SN3 in the SPM were set to system conditions during preinstallation.

Procedure:

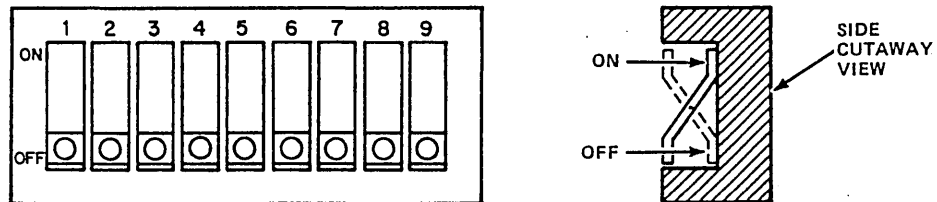
- ___ 1. Set all circuit breakers on interbay power panel to OFF. This may already have been done.
- ___ 2. Remove two retaining screws and open SPM door (figure 3-40).
- ___ 3. Verify all SPM switch settings are correct. Refer to Checking SPM Preoperating Conditions in section 2 of this manual.
- ___ 4. Close SPM door and install retaining screws.
- ___ 5. Set wall-mounted circuit breaker that controls 50/60-Hz power to SPM to ON. This circuit breaker may not be present at all sites.

APPLYING SYSTEM POWER (Sheet 3 of 32)

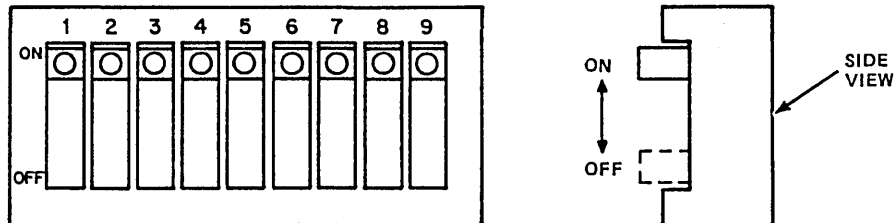
APPLY M-G SET POWER FROM SPM (Cont'd)



SN1, SN2, AND SN3 DETENT SWITCHES



SN1, SN2, AND SN3 SLIDE SWITCHES



NOTES:

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1. FRONT VIEWS SHOW SWITCHES SET TO ON. SWITCH POSITIONS VARY, DEPENDING ON SITE CONFIGURATIONS AND OPTIONS.
2. SN1 AND SN2 HAVE ONLY EIGHT SWITCHES. SN3 HAS NINE.
3. SN1, SN2, AND SN3 MAY BE DETENT, SLIDE, OR OTHER SWITCHES.

Figure 3-40. SPM Switches SN1, SN2, and SN3

APPLYING SYSTEM POWER (Sheet 4 of 32)

APPLY M-G SET POWER FROM SPM (Cont'd)

- ___ 6. Set keyswitch on side of SPM (figure 3-41) to LOCAL.
- ___ 7. Set SYSTEM EMERGENCY switch on interbay to ON.
- ___ 8. Set SYSTEM DISCONNECT switch on left side of SPM to ON. This applies 50/60-Hz power to SPM.
- ___ 9. Press and release LOCAL START switch on front of SPM. Switch SN2-8 in SPM must be set to OFF (per preinstallation instructions); if not, COLUMN FAULT indicator lights at this time.


NOTE

Allow 1 min for MG to reach full output voltage.

- ___ 10. Verify that SYSTEM ON and ROOM ON indicators on SPM are lit and SPM cooling fan is running.
- ___ 11. Set selector switch to select system MG being used: selection 1, 2, 3, or 4.
- ___ 12. Set function switch on front of SPM to MG PHASE 1. Verify that MG phase 1 voltage display is between 118 V and 120 V.
- ___ 13. Set function switch to MG PHASE 2. Verify that MG PHASE 2 voltage display is between 118 V and 120 V.
- ___ 14. Set function switch to MG PHASE 3. Verify that MG PHASE 3 voltage display is between 118 V and 120 V.
- ___ 15. Adjust VOLTAGE ADJUST setscrew on front of SPM, if necessary, to obtain correct MG phase voltages.
- ___ 16. Repeat steps 10 through 14 for other M-G sets in system, if applicable.
- ___ 17. Verify that electrician has checked for the presence of correct voltages and phases of 50/60-Hz and 400-Hz power at input terminals of power distribution box in interbay power panel. Power checks must be made as described in section 5 of this manual.
- ___ 18. Set LOCAL/REMOTE switch on each 102 L/min (27-gal/min) water cooling unit to REMOTE, or set MANUAL/AUTO switch on 220-L/min (58-gal/min) water cooling unit to MANUAL. This allows SPM to control starting and stopping of water cooling units.
- ___ 19. Press STOP switch on front of SPM, and verify powerdown of M-G set and water cooling units.
- ___ 20. Wait 5 min for MG to power down.
- ___ 21. Press LOCAL START switch on front of SPM to restart M-G set and water cooling units. Allow M-G power to remain on for following checks.

APPLY M-G SET POWER FROM SPM (Cont'd)



DATA				UNIT	SUB UNIT
<div><div>0</div><div>0</div><div>0</div><div>0</div></div>				<div><div>0</div><div>0</div></div>	<div><div>0</div></div>
6	0	7	°F	F	TEMP (ROOM)
3	4	3	% RELATIVE HUMIDITY	H	HUMIDITY (ROOM)
4	7	2	DEWPOINT OF	D	DEWPOINT (ROOM)
1	1	0	AC VOLTS NEUTRAL TO SELECTED PHASE	L	MG 
-	4	6	VOLTS DC	1	COLUMN BEING SCANNED
6	2	4	WATER TEMP °F	L	CHILLER

1 IF EPROM 22109583 IS INSTALLED THEN THE DEWPOINT ACTUALLY DISPLAYS TEMPERATURE.

01078A-1

Figure 3-41. System Power Monitor Switches and Display Panel

APPLYING SYSTEM POWER (Sheet 6 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU NIO CABINET

Use this procedure for the first application of power to the IOU nonconcurrent input/output (NIO) cabinet and for the adjustment of the NIO logic voltages. The next procedure covers the application and adjustment of power to the IOU concurrent input/output (CIO) cabinet.

NOTE

This procedure includes turning on the clock
(master oscillator) power.

Procedure prerequisites:

- Water cooling unit for IOU is operating.
- All previous checkout procedures are completed.

Equipment required:

- Digital multimeter, John Fluke model 8020A or equivalent.

Procedure:

- ___ 1. Set following circuit breakers and voltage adjust knobs on both NIO and CIO cabinets power distribution boxes (figure 3-42) as follows:
 - ___ a. MAIN DISCONNECT to OFF
 - ___ b. -2.2 V DISCONNECT to OFF
 - ___ c. -5.2 V DISCONNECT to OFF
 - ___ d. -2.2 V ADJUST knob fully counterclockwise
 - ___ e. -5.2 V ADJUST knob fully counterclockwise
 - ___ f. +5.5 V DISCONNECT TO OFF (This only applies to the CIO cabinet of IOU.)
 - ___ g. +5.5 V ADJUST knob fully counterclockwise (This only applies to the CIO cabinet of IOU.)
 - ___ h. Set mode switch on top right corner of both NIO and CIO power distribution boxes to LOCAL.
- ___ 2. Set CB3 switch on auxiliary power supply at rear of NIO cabinet to off, down position.
- ___ 3. Set wall-mounted circuit breakers that control 50/60-Hz and 400-Hz power to interbay power panel to ON.

APPLYING SYSTEM POWER (Sheet 7 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU NIO CABINET (Cont'd)

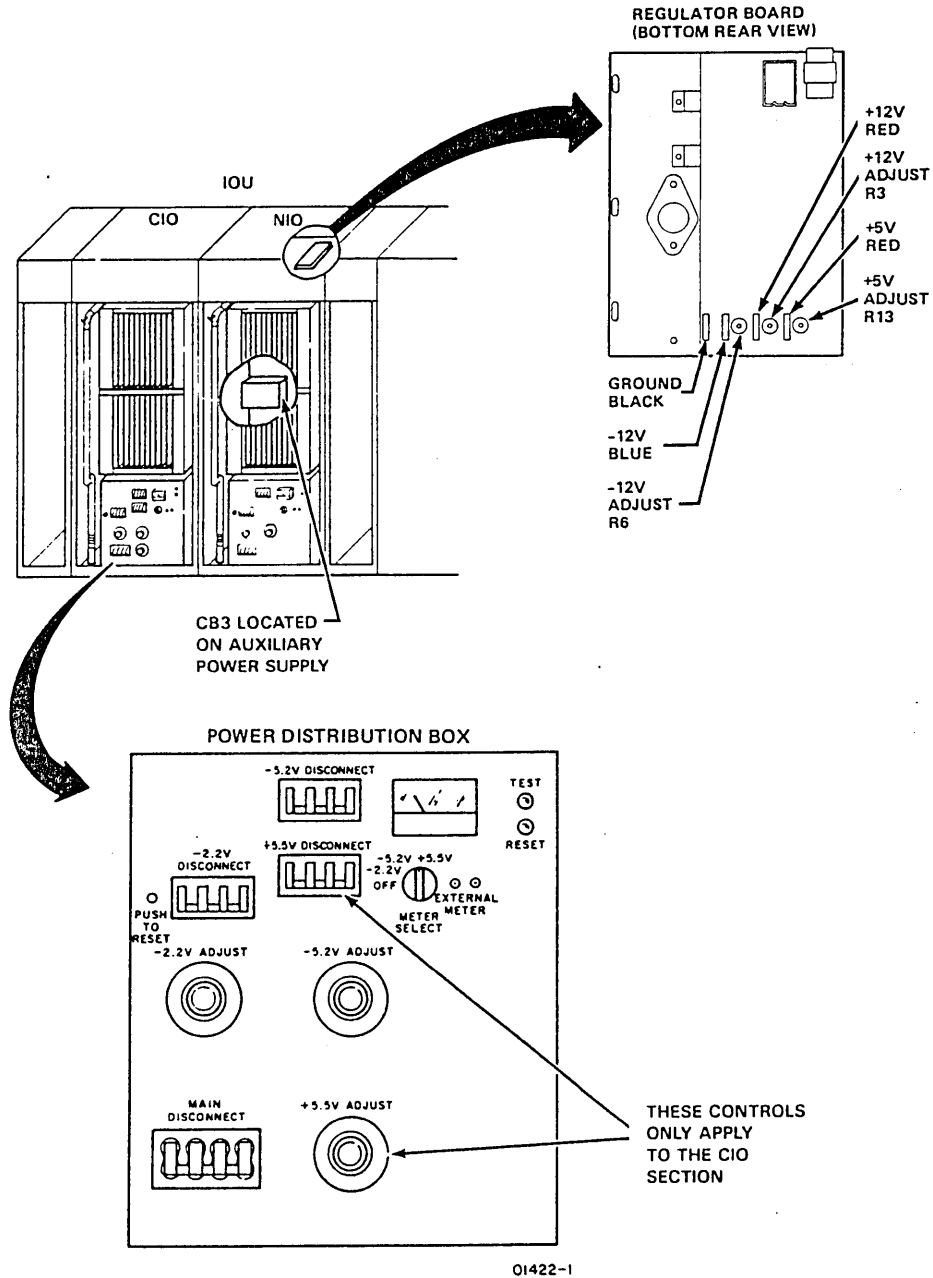


Figure 3-42. IOU Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 8 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU NIO CABINET (Cont'd)

- ___ 4. Set 50/60-Hz MAIN DISCONNECT and 400-Hz MAIN DISCONNECT circuit breakers on interbay power panel to ON.
- ___ 5. Set IOU-1 50/60-Hz circuit breaker and IOU-1 400-Hz circuit breaker on interbay power panel to ON.
- ___ 6. Set CB3 on auxiliary power supply to on, up position.
- ___ 7. Apply NIO cabinet power by sequentially setting section circuit breakers (figure 3-43) as follows:
 - ___ a. -2.2 V DISCONNECT to ON
 - ___ b. -5.2 V DISCONNECT to ON
 - ___ c. MAIN DISCONNECT to ON
 - ___ d. Press and release RESET switch at front and upper-right corner of power distribution box.
- ___ 8. Listen for noise of circulating air to check for operation of section blower.
- ___ 9. Zero percentage meter on power distribution box as follows:
 - ___ a. Set METER SELECT switch to OFF.
 - ___ b. Turn screw on front of percentage meter, if necessary, to align meter indicator at mechanical zero mark at far left of scale.
- ___ 10. Set multimeter to measure -5.2 Vdc.
- ___ 11. Connect multimeter test leads to red (+) and blue (-) EXTERNAL METER test points on power distribution box.
- ___ 12. Adjust -5.2 V as follows:
 - ___ a. Set METER SELECT switch to -5.2 V.
 - ___ b. Turn -5.2 V ADJUST knob slowly on front of power distribution box until multimeter indicates a nominal -5.20 V.

CAUTION

Exposed terminals within the power distribution box contain 110 Vac.

- ___ c. Adjust R5 at rear of percentage meter to obtain a percentage meter indication of 0. If R4 did not require adjustment, access R5 by swinging power distribution box outward from cabinet and removing top plate. Do not reinstall top plate after adjustment.

APPLYING SYSTEM POWER (Sheet 9 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU NIO CABINET (Cont'd)

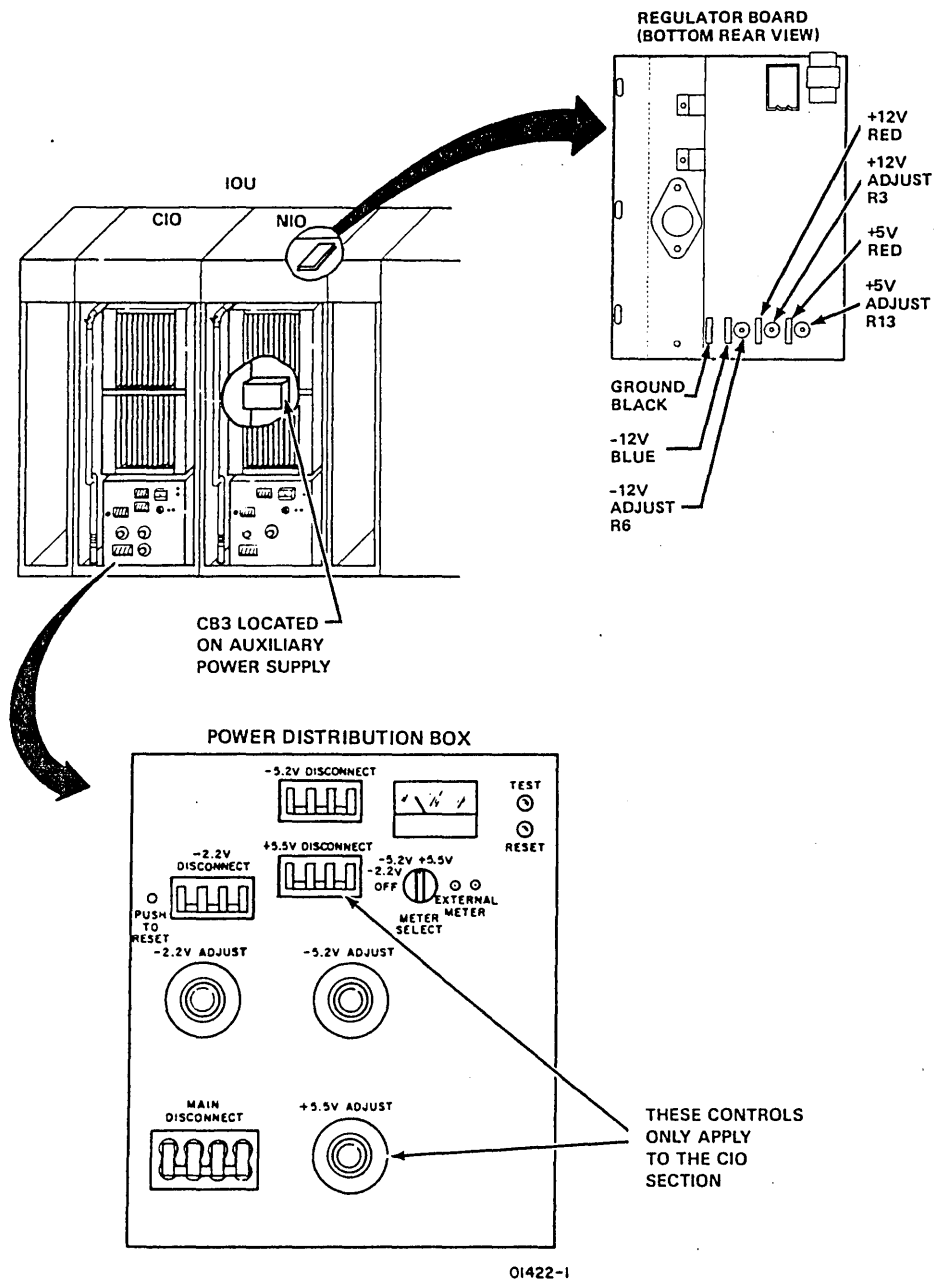


Figure 3-43. IOU Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 10 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU NIO CABINET (Cont'd)

___ 13. Adjust -2.2 V as follows:

- ___ a. Set meter SELECT SWITCH to -2.2 V.
- ___ b. Turn -2.2 V ADJUST knob slowly on front of power distribution box until multimeter indicates a nominal -2.20 V.
- ___ c. Adjust R4 at rear of percentage meter, if necessary, to obtain a percentage meter indication of 0. Access R4 by swinging power distribution box outward from cabinet and removing top plate.
- ___ d. Disconnect multimeter from EXTERNAL METER test points.
- ___ e. Install top plate, if removed earlier, on power distribution box.

___ 14. Adjust auxiliary power supply +5 V as follows:

- ___ a. Connect multimeter to ground and +5 V test points on auxiliary power supply regulator board near top and rear of NIO section (figure 3-44).
- ___ b. Turn regulator board potentiometer R13 setscrew until multimeter indicates a nominal +5.00 V.

___ 15. Adjust auxiliary power supply -12 V as follows:

- ___ a. Set multimeter to read -12 Vdc.
- ___ b. Reconnect multimeter to ground and -12 V test points on regulator board (figure 3-44).
- ___ c. Turn potentiometer R6 setscrew until multimeter indicates a nominal -12.00 V.

APPLYING SYSTEM POWER (Sheet 11 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU NIO CABINET (Cont'd)

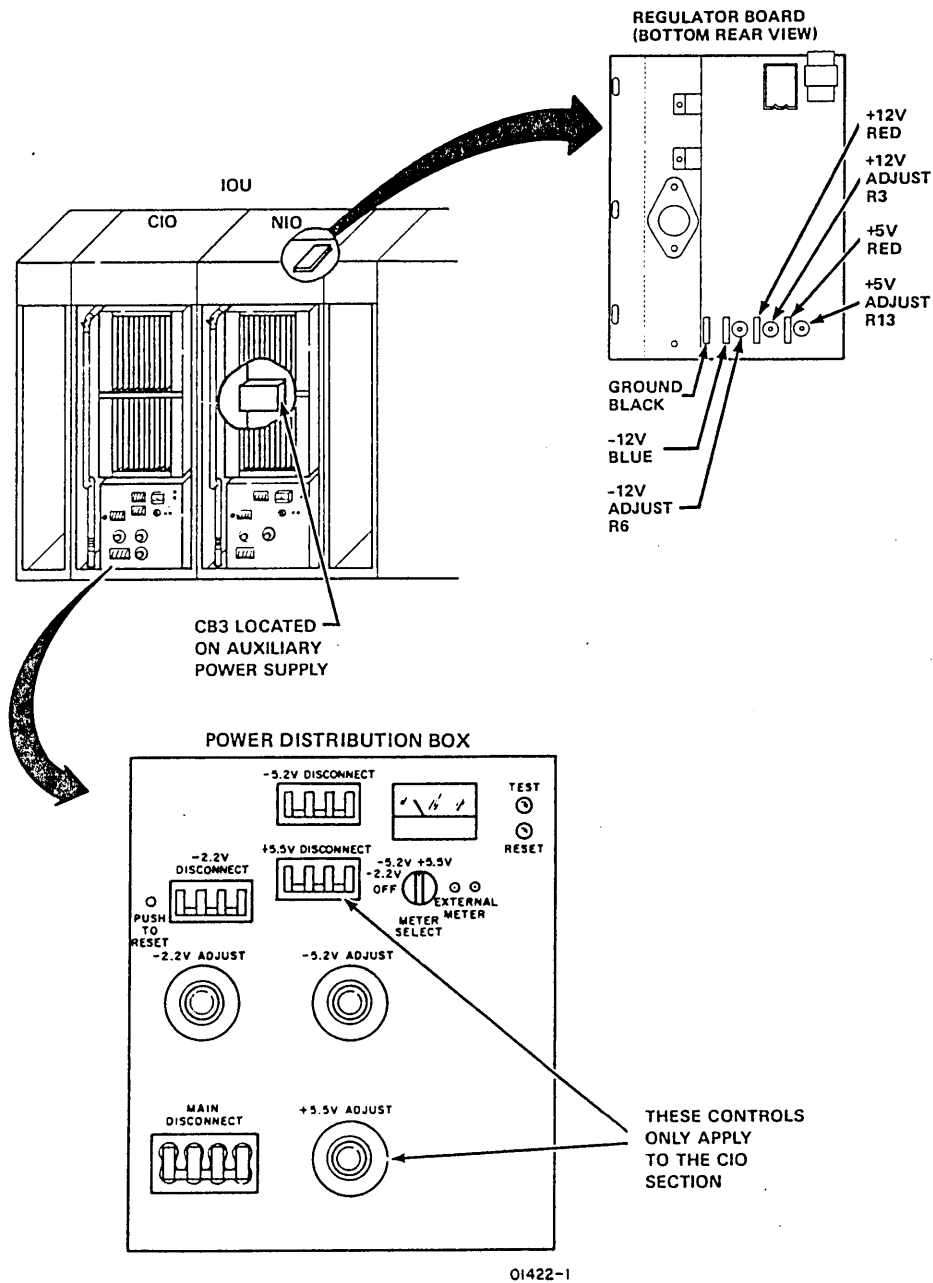


Figure 3-44. IOU Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 12 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU NIO CABINET (Cont'd)

- ___ 16. Adjust auxiliary power supply +12 V as follows:
 - ___ a. Set multimeter to measure +12 V.
 - ___ b. Reconnect multimeter ground and to +12 V test points on regulator board (figure 3-45).
 - ___ c. Turn potentiometer R3 setscrew until multimeter indicates a nominal +12.00 V.
 - ___ d. Disconnect multimeter from regulator board.
- ___ 17. Check low-temperature sensor voltage and, if necessary, adjust it as follows:
 - ___ a. Set multimeter to measure 9 to 10 Vdc.

CAUTION

Place multimeter leads lightly on TB1 terminals (figure 5-51) to prevent bending of the low-temperature assembly. Bending may cause an erroneous voltage reading.

- ___ b. Place meter negative (-) lead on low-temperature sensor TB1-1 and positive lead (+) on TB1-3.
 - ___ c. Observe multimeter reading from 9.9 to 10.1 Vdc. If voltage is not within this range, adjust potentiometer on low-temperature assembly.
 - ___ d. Remove multimeter leads from TB1.
- ___ 18. Set mode switch on top right corner of power distribution box to REMOTE.
 - ___ 19. Swing power distribution box into IOU and install retaining screw.

APPLYING SYSTEM POWER (Sheet 13 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU NIO CABINET (Cont'd)

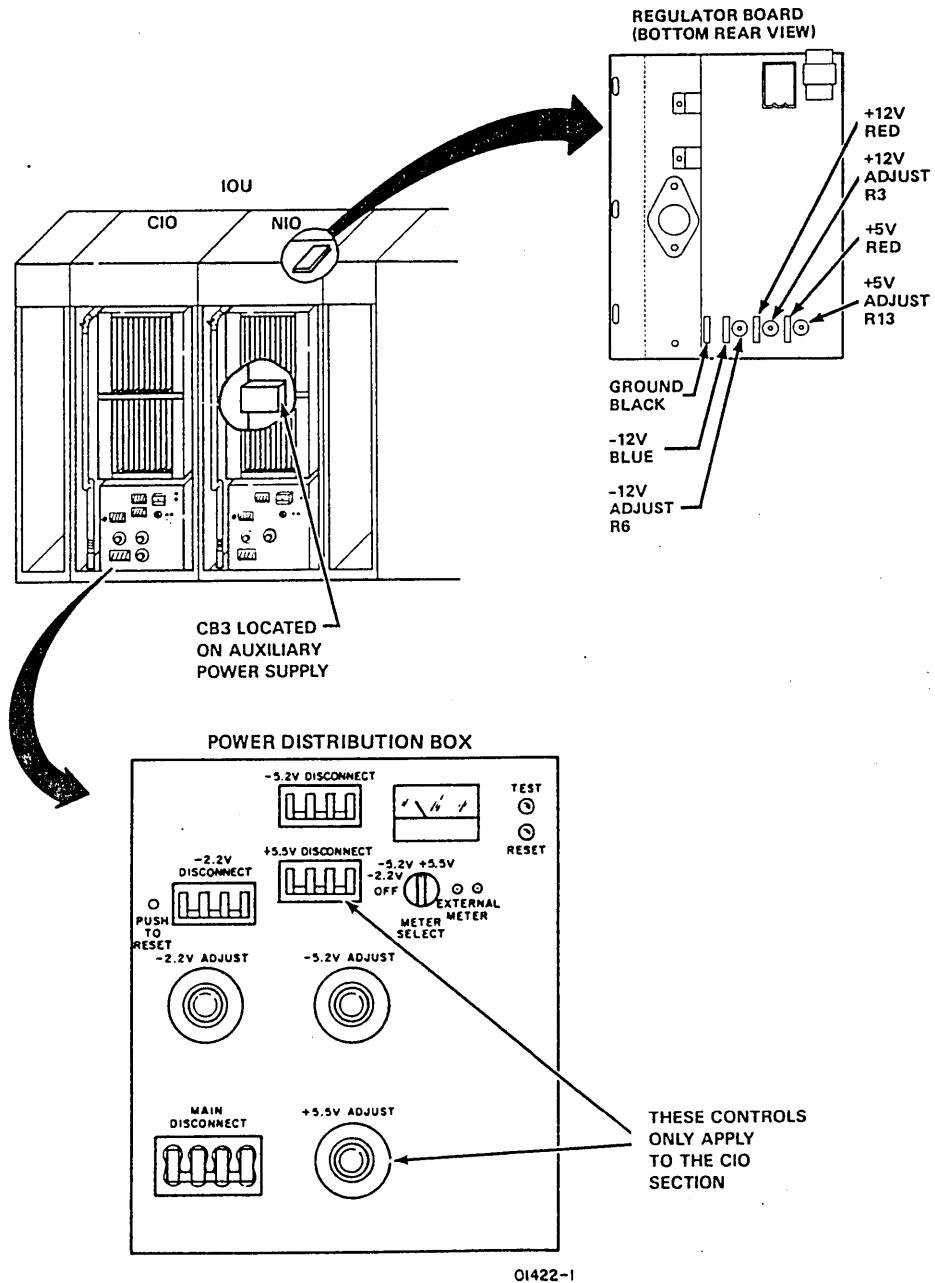


Figure 3-45. IOU Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 14 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU OPTIONAL CIO CABINET

Use this procedure for the first application of power to the IOU concurrent input/output (CIO) section.

Procedure prerequisites:

- Water cooling unit for IOU is operating.
- The previous checkout procedure for the IOU NIO cabinet is completed.

Equipment required:

- Digital multimeter, John Fluke model 8020A or equivalent.

Procedure:

- ___ 1. Set IOU-2 50/60-Hz circuit breaker and IOU-2 400-Hz circuit breaker on interbay power panel to ON.
- ___ 2. Apply CIO cabinet power by sequentially setting section circuit breakers (figure 3-46) as follows:
 - ___ a. -2.2 V DISCONNECT to ON
 - ___ b. -5.2 V DISCONNECT to ON
 - ___ c. +5.5 V DISCONNECT to ON
 - ___ d. MAIN DISCONNECT to ON
 - ___ e. Set mode switch at top right corner of power distribution box to LOCAL.
 - ___ f. Press and release RESET switch at upper-right corner of power distribution box.
- ___ 3. Listen for noise of circulating air to check for operation of section blower.
- ___ 4. Zero percentage meter on power distribution box as follows:
 - ___ a. Set METER SELECT switch to OFF.
 - ___ b. Turn screw on front of percentage meter, if necessary, to align meter indicator at mechanical zero mark at far left of scale.
- ___ 5. Set multimeter to measure -5.2 Vdc.
- ___ 6. Connect multimeter test leads to red (+) and blue (-) to EXTERNAL METER test points on power distribution box.

APPLYING SYSTEM POWER (Sheet 15 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU OPTIONAL CIO CABINET (Cont'd)

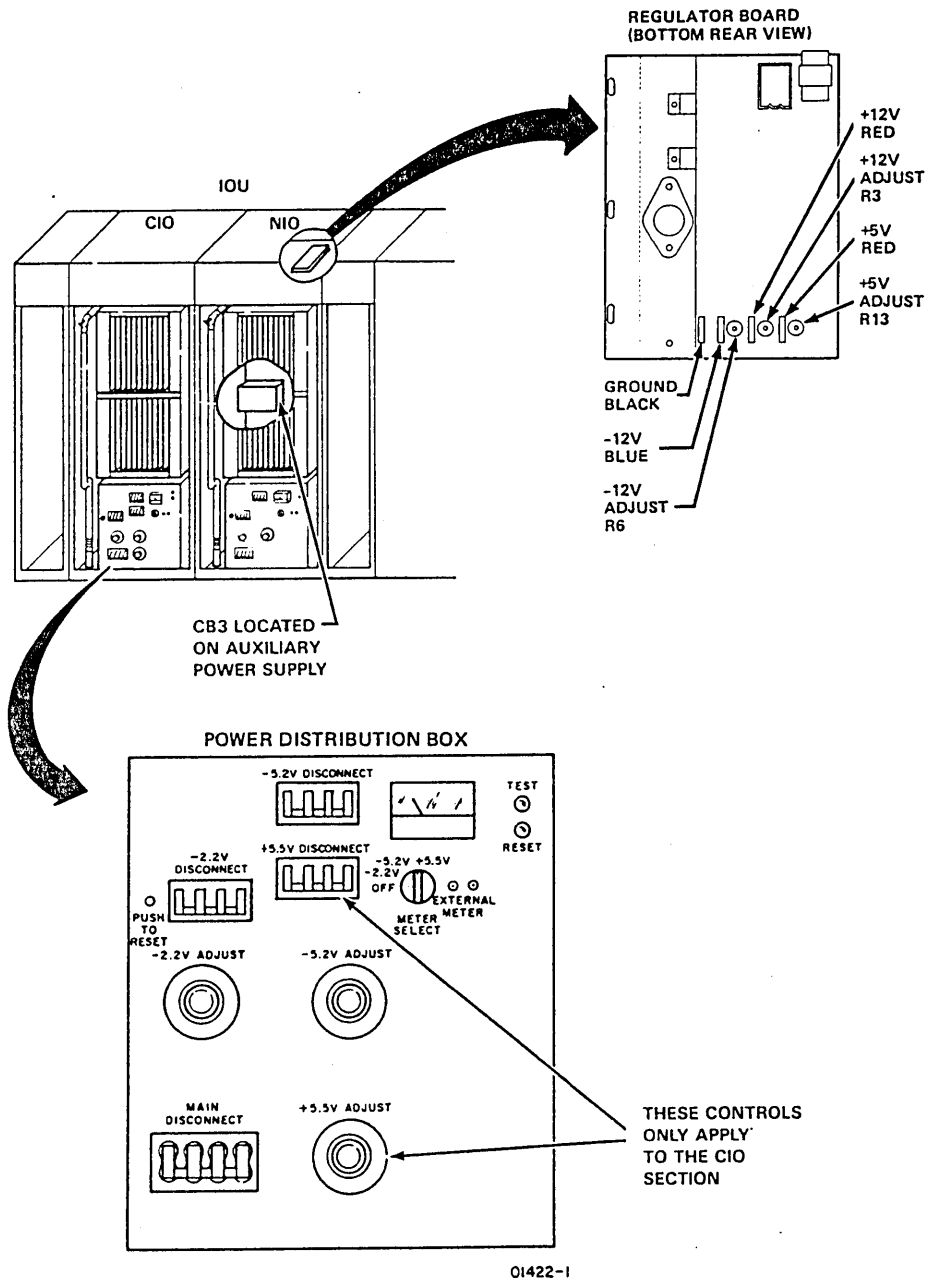


Figure 3-46. IOU Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 16 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU OPTIONAL CIO CABINET (Cont'd)

___ 7. Adjust -5.2 V as follows:

- ___ a. Set METER SELECT switch to -5.2 V.
- ___ b. Turn -5.2 V ADJUST knob slowly on front of power distribution box until multimeter indicates a nominal -5.20 V.

CAUTION

Exposed terminals within the power distribution box contain 110 Vac.

- ___ c. Adjust R5 at rear of percentage meter to obtain a percentage meter indication of 0. If R4 did not require adjustment, access R5 by swinging power distribution box outward from cabinet and removing top plate. Do not reinstall top plate after adjustment.

___ 8. Adjust -2.2 V as follows:

- ___ a. Set meter SELECT SWITCH (figure 3-47) to -2.2 V.
- ___ b. Turn -2.2 V ADJUST knob slowly on front of power distribution box until multimeter indicates a nominal -2.20 V.
- ___ c. Adjust R4 at rear of percentage meter, if necessary, to obtain a percentage meter indication of 0. If R5 did not require adjustment, access R4 by swinging power distribution box outward from cabinet and removing top plate. Do not reinstall top plate after adjustment.

NOTE

Be sure to adjust the +5.5 V after adjusting the -2.2 V and -5.2 V.

APPLYING SYSTEM POWER (Sheet 17 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU OPTIONAL CIO CABINET (Cont'd)

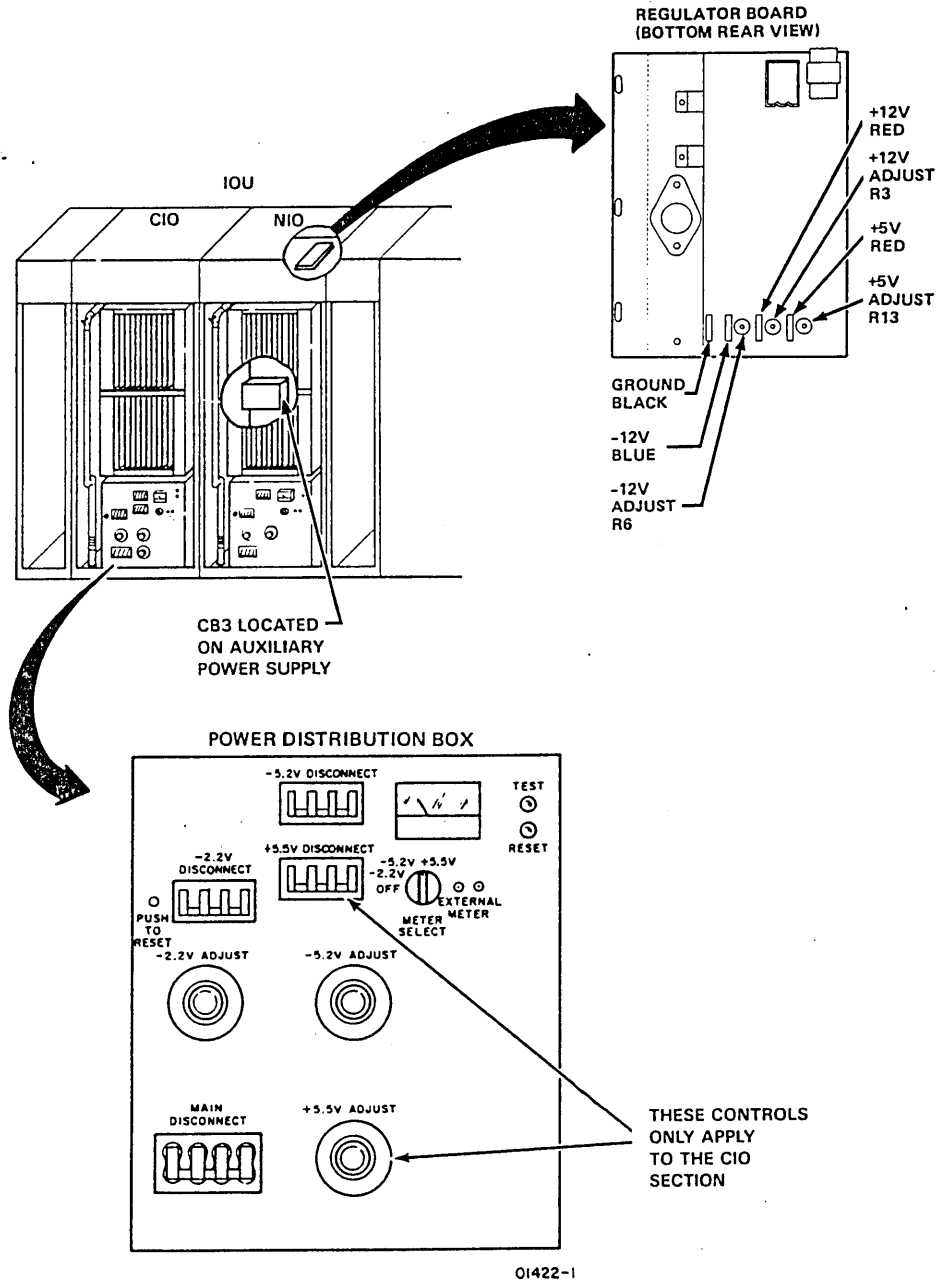


Figure 3-47. IOU Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 18 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU OPTIONAL CIO CABINET (Cont'd)

- ___ 9. Adjust CIO power supply +5.5 V as follows:
 - ___ a. Set meter SELECT SWITCH to +5.5 V.
 - ___ b. Turn +5.5 V ADJUST knob slowly on front of power distribution box until multimeter indicates a nominal +5.00 V.
 - ___ c. Adjust R6 at rear of percentage meter to obtain a percentage meter indication of 0. If R4 or R5 did not require adjustment, access R6 by swinging power distribution box outward from cabinet and removing top plate.
 - ___ d. Disconnect multimeter from EXTERNAL METER test points.
 - ___ e. Install top plate, if removed earlier, on power distribution box.
- ___ 10. Check low-temperature sensor voltage and, if necessary, adjust it as follows:
 - ___ a. Set multimeter to measure 9 to 10 Vdc.

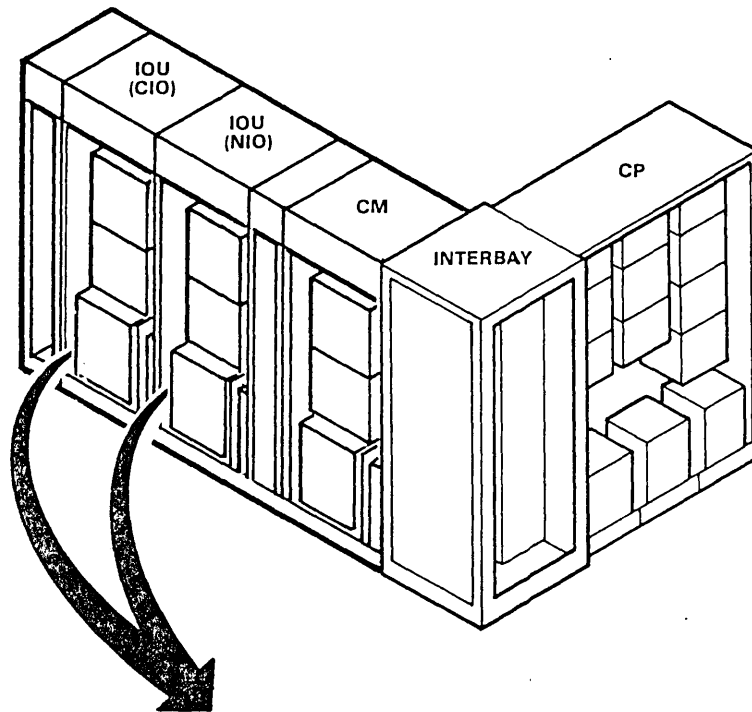
CAUTION

Place multimeter leads lightly on TB1 terminals to prevent bending of the low-temperature assembly. Bending may cause an erroneous voltage reading.

- ___ b. Place meter negative (-) lead on low-temperature sensor TB1-1 and positive lead (+) on TB1-3 (figure 3-48).
- ___ c. Observe multimeter reading from 9.9 to 10.1 Vdc. If voltage is not within this range, adjust potentiometer on low-temperature assembly.
- ___ d. Remove multimeter leads from TB1.
- ___ 11. Set mode switch on top right corner of power distribution box to REMOTE.
- ___ 12. Swing power distribution box into IOU and install retaining screw.

APPLYING SYSTEM POWER (Sheet 19 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU OPTIONAL CIO CABINET (Cont'd)



LOW-TEMPERATURE SENSOR

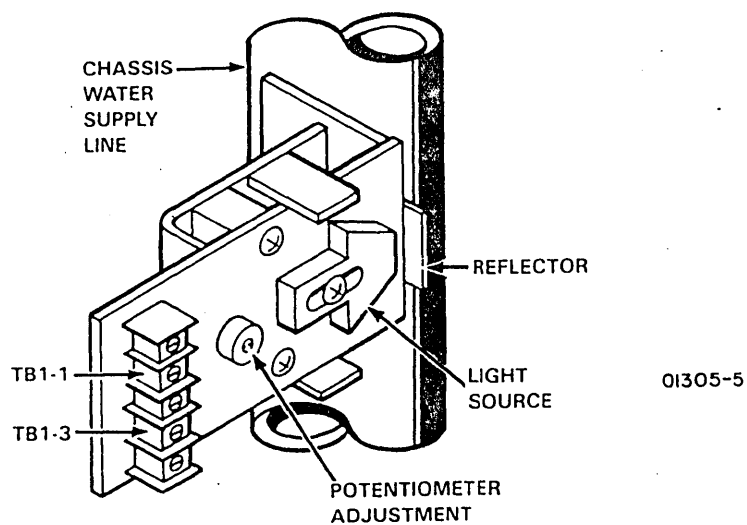


Figure 3-48. IOU Low-Temperature Sensor Assembly

APPLYING SYSTEM POWER (Sheet 20 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CP-0 AND OPTIONAL CP-1

Use this procedure for the first application of 400-Hz power to the CP cabinets and for the adjustment of CP logic voltages in both the CP-0 and optional CP-1 cabinets.

Procedure prerequisite:

- All previous installation and checkout procedures have been completed.

Equipment required:

- Digital multimeter, John Fluke Model 8020A or equivalent

Procedure:

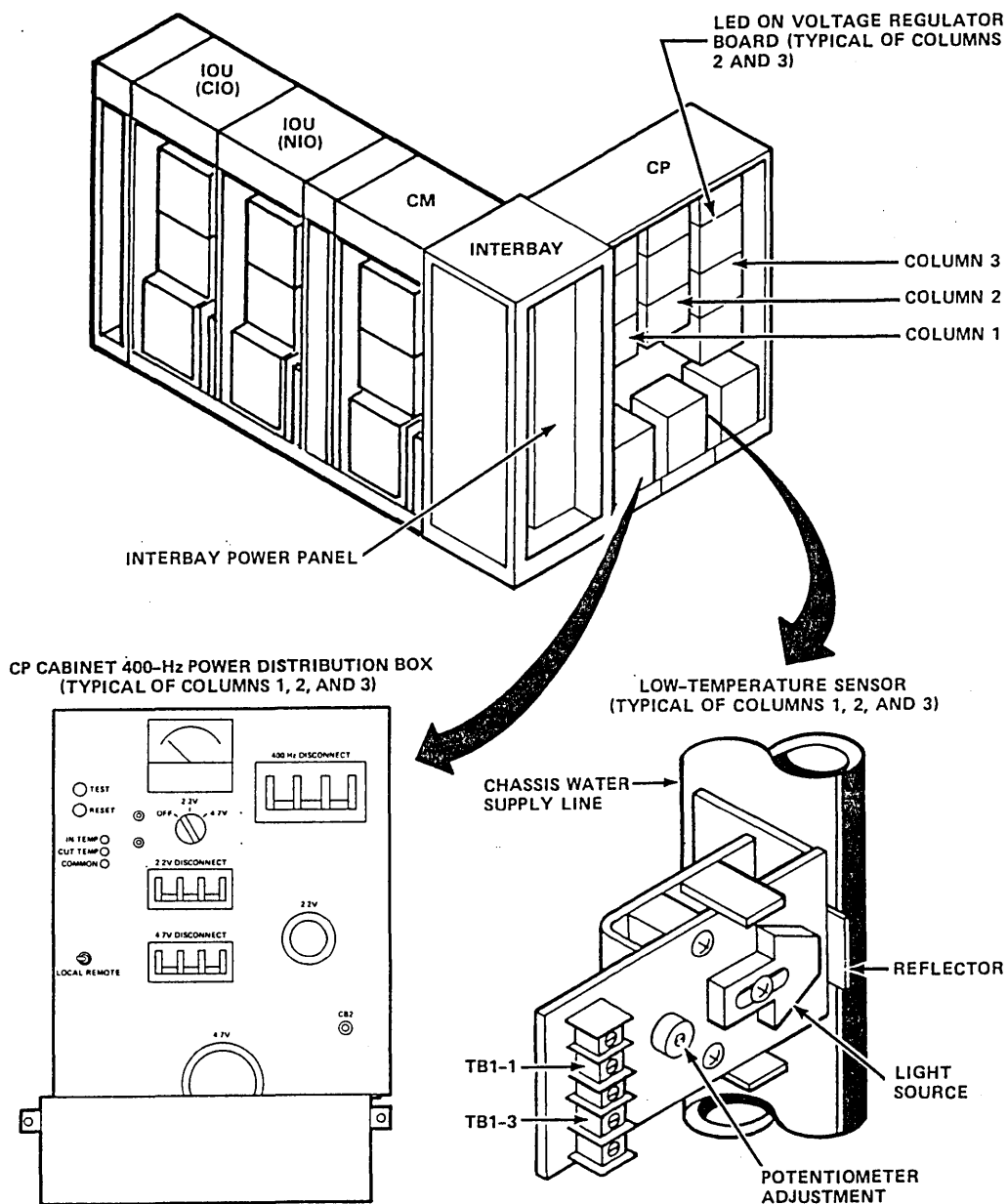
- ___ 1. Set following circuit breakers, voltage adjust knobs, and switches at bottom of each CP column (figure 3-49) as follows:
 - ___ a. 400-Hz DISCONNECT to OFF
 - ___ b. 2.2 V DISCONNECT to OFF
 - ___ c. 4.7 V DISCONNECT to OFF
 - ___ d. 2.2 V adjust knob fully counterclockwise
 - ___ e. 4.7 V adjust knob fully counterclockwise
 - ___ f. Mode switch to LOCAL
- ___ 2. Set CPU0-1 400-Hz circuit breaker on interbay power panel to ON.

NOTE

The following steps are for CP column 1.
They must be repeated for columns 2 and 3.

APPLYING SYSTEM POWER (Sheet 21 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CP-0 AND OPTIONAL CP-1 (Cont'd)



01305-3

Figure 3-49. CP Power Controls and Adjustments

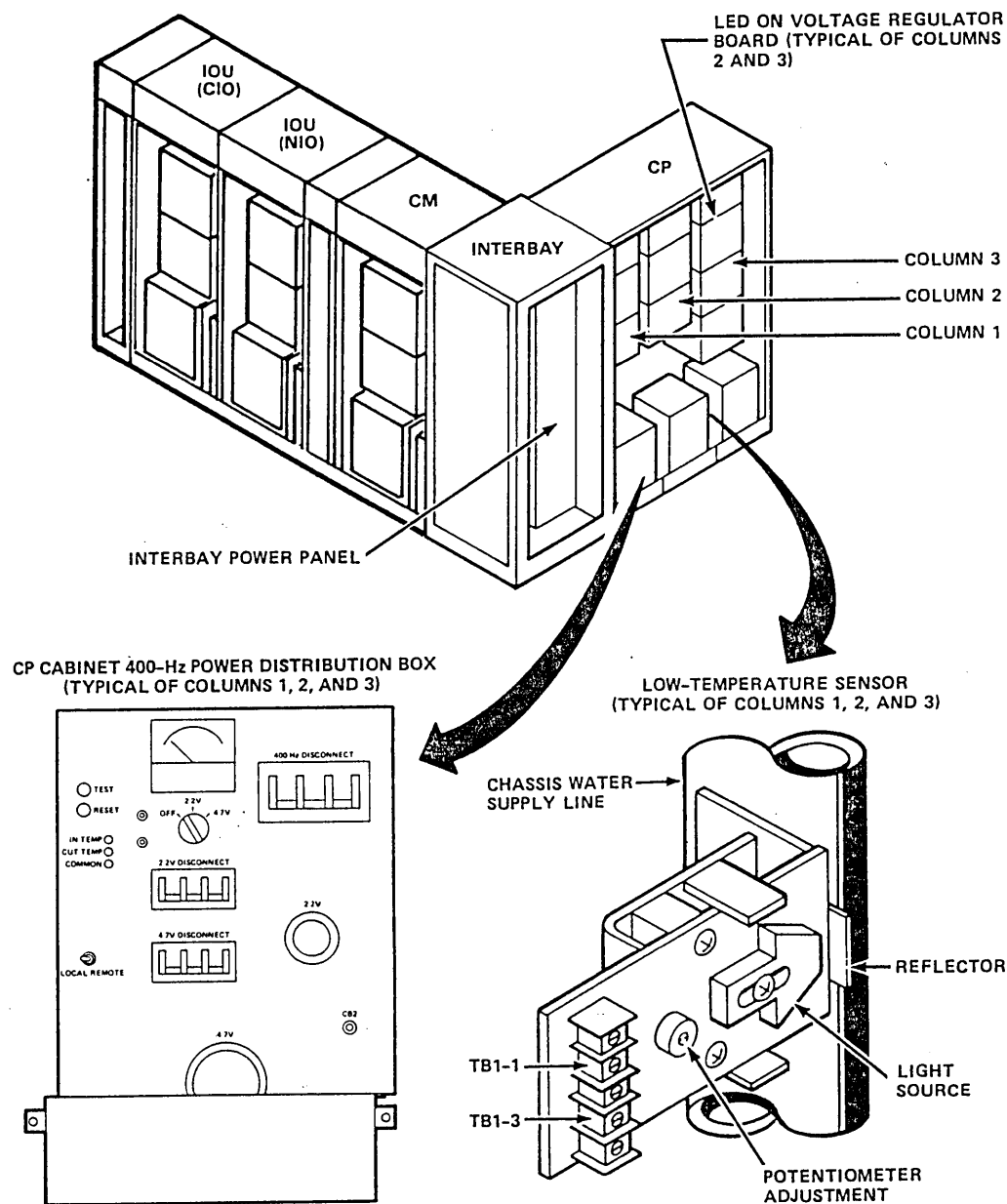
APPLYING SYSTEM POWER (Sheet 22 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CP-0 AND OPTIONAL CP-1 (Cont'd)

- ___ 3. Set 400-Hz DISCONNECT circuit breaker at CP-0 column 1 to ON.
 - ___ a. Visually check to see that POWER SUPPLY OFF indicator, located on top of 400-Hz power distribution box, is lit. All column indicators are off.
 - ___ b. Visually check to see that voltage regulator board light emitting diode (LED), located on left edge of board, is lit. This substep applies to columns 2 and 3 only.
- ___ 4. Set 2.2 V DISCONNECT and 4.7 V DISCONNECT circuit breakers to ON.
- ___ 5. Press and release RESET switch on front of power distribution box (figure 3-50).
 - ___ a. Verify that POWER SUPPLY OFF indicator is not lit.
 - ___ b. Verify that POWER ON indicator is lit.
- ___ 6. Set multimeter to a scale that measures 2 V dc to 5 V dc.
- ___ 7. Connect multimeter test leads to + (red) and - (blue) test points below percentage meter on column power supply.
- ___ 8. Mechanically zero percentage meter indicator as follows:
 - ___ a. Set meter select switch to OFF.
 - ___ b. Turn screw on front of percentage meter, if necessary, to align meter indicator at mechanical zero mark at far left of scale.
- ___ 9. Adjust power supply 4.7 V and percentage meter as follows:
 - ___ a. Set meter select switch to 4.7 V.
 - ___ b. Turn 4.7 V adjust knob on front of power distribution box slowly until multimeter indicates 4.8 V dc.
 - ___ c. Use a nonmetallic tool to adjust meter, if necessary, to 0. Do this by sliding power distribution box outward, removing top mesh cover, and adjusting 4.7 V METER ADJ screw on top of box.
- ___ 10. Adjust power supply 2.2 V and percentage meter as follows:
 - ___ a. Set meter select switch to 2.2 V.
 - ___ b. Turn 2.2 V adjust knob on front of power distribution box slowly until multimeter indicates 2.25 V dc (2.85 V dc for columns 2 and 3). If 2.2 V DISCONNECT circuit breaker trips to OFF, perform these steps:
 - ___ 1) Turn 2.2 V adjust knob a few degrees in a clockwise direction past trip point.
 - ___ 2) Reset 2.2 V DISCONNECT circuit breaker.

APPLYING SYSTEM POWER (Sheet 23 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CP-0 AND OPTIONAL CP-1 (Cont'd)



01305-3

Figure 3-50. CP Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 24 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CP-0 AND OPTIONAL CP-1 (Cont'd)

- ___ 3) Push and release RESET switch on front of power distribution box (figure 3-51).
- ___ 4) Turn 2.2 V adjust knob clockwise until multimeter reads 2.25 V dc (2.85 V dc for columns 2 and 3).
- ___ c. Use a nonmetallic tool to adjust meter, if necessary, to 0. Do this by sliding power distribution box outward, removing top mesh cover, and adjusting 2.2 V METER ADJ screw at top of box.
- ___ 11. Disconnect multimeter test leads from power distribution box.
- ___ 12. Check low-temperature sensor voltage and, if necessary, adjust it as follows:
 - ___ a. Set multimeter to a scale that measures 10 V dc.

CAUTION

Place multimeter leads lightly on TB1 to prevent bending of the low-temperature assembly and a possible erroneous voltage reading.

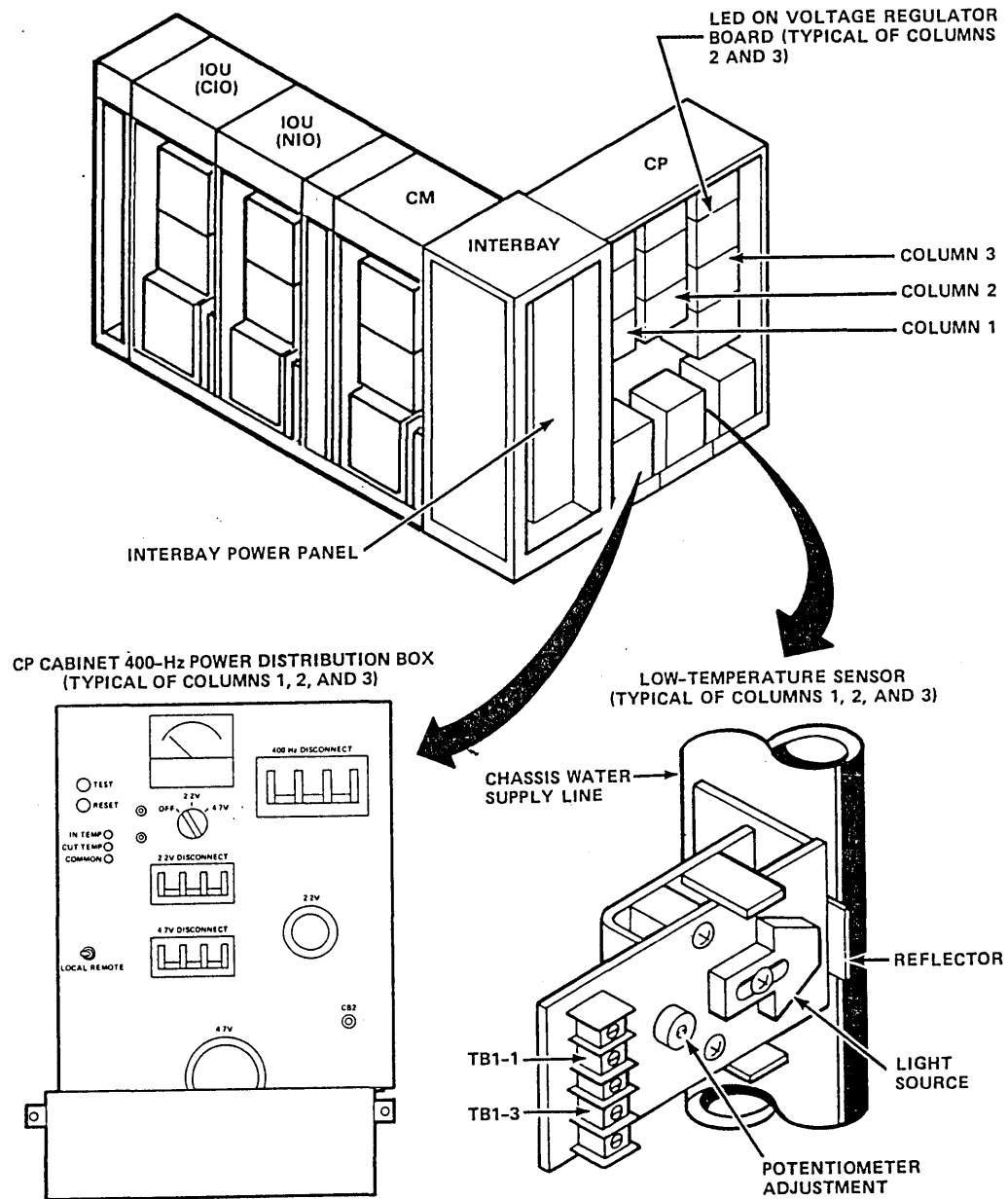
- ___ b. Place meter negative lead (-) on low-temperature sensor TB1-1 and positive lead (+) on TB1-3.
- ___ c. Check to see that multimeter reading is from 9.9 to 10.1 V dc. If voltage is not within this range, correct it by adjusting potentiometer on low-temperature sensor.
- ___ d. Remove multimeter leads from TB1.
- ___ 13. Set mode switch on front of power distribution box to REMOTE.
- ___ 14. Replace top mesh cover, and slide power distribution box back into column if meter adjustment was necessary. Do not reinstall retaining screws at front of box.
- ___ 15. Repeat steps 4 through 15 for CP column 2.
- ___ 16. Repeat steps 4 through 15 for CP column 3.

IS OPTIONAL CP-1 PART OF INSTALLATION?

- If yes, repeat this procedure for optional CP-1.
- If no, go to next procedure.

APPLYING SYSTEM POWER (Sheet 25 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CP-0 AND OPTIONAL CP-1 (Cont'd)



01305-3

Figure 3-51. CP Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 26 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CM

Use this procedure for applying 400-Hz power to the CM cabinet and adjusting its logic voltages.

Procedure prerequisite:

- All previous installation and checkout procedures are complete.

Equipment required:

- Digital multimeter, John Fluke Model 8020A or equivalent

Procedure:

- ___ 1. Set MEM 50/60-Hz circuit breaker and MEM 400-Hz circuit breaker on interbay power panel to ON.
- ___ 2. Set following circuit breakers and voltage adjust knobs on CM power distribution box (figure 3-52) as follows:
 - ___ a. MAIN DISCONNECT to OFF
 - ___ b. -2.2 V DISCONNECT to OFF
 - ___ c. +5.5 V DISCONNECT to OFF
 - ___ d. -5.2 V DISCONNECT to OFF
 - ___ e. -2.2 V ADJUST knob fully counterclockwise
 - ___ f. -5.2 V ADJUST knob fully counterclockwise
 - ___ g. +5.5 V ADJUST knob fully counterclockwise
 - ___ h. Mode switch on top of 400-Hz power distribution box to LOCAL
- ___ 3. Apply power by sequentially setting circuit breakers on power distribution box as follows:
 - ___ a. -2.2 V DISCONNECT to ON
 - ___ b. -5.2 V DISCONNECT to ON
 - ___ c. +5.5 V DISCONNECT to ON
 - ___ d. MAIN DISCONNECT to ON
- ___ 4. Press RESET button, located at upper right corner of power distribution box.
- ___ 5. Listen for circulating air to verify that CM blower is operating. If blower is not operating, remove power from CM and correct fault.
- ___ 6. Set digital multimeter to a V dc scale that measures 5.2 V.

APPLYING SYSTEM POWER (Sheet 27 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CM (Cont'd)

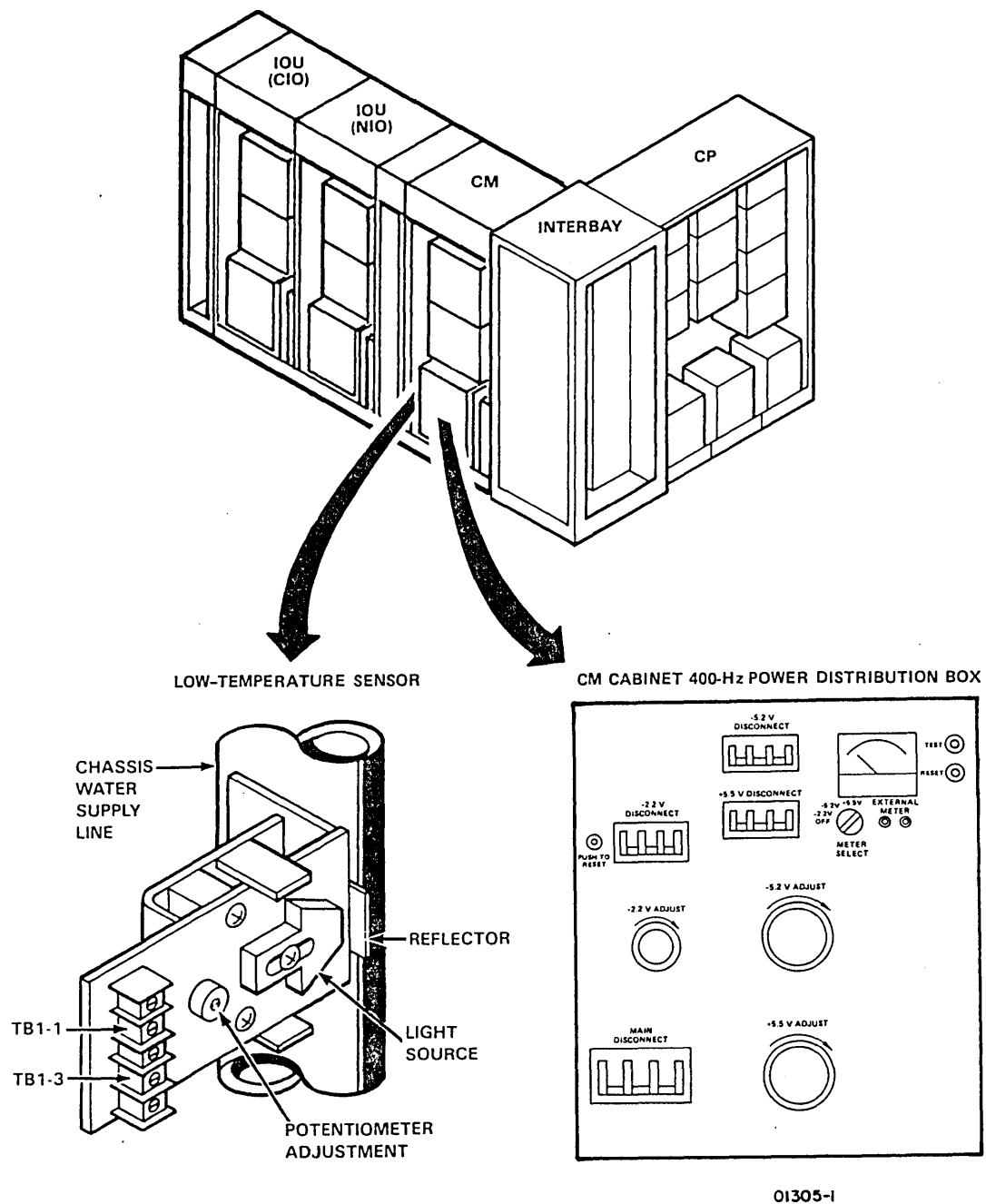


Figure 3-52. CM Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 28 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CM (Cont'd)

- ___ 7. Zero percentage meter on power distribution box (figure 3-53) as follows:
- ___ a. Set METER SELECT switch to OFF.
 - ___ b. Turn screw on front of percentage meter, if necessary, to align meter indicator at mechanical zero mark at far left of scale.

NOTE

The following voltage adjustments must be made in the order given.

- ___ 8. Adjust -5.2 V as follows:
- ___ a. Set METER SELECT switch to -5.2 V.
 - ___ b. Turn -5.2 V adjust knob on front of power distribution box slowly until multimeter indicates a nominal -5.2 V.

WARNING

Exposed terminals in power distribution box contain 110 V ac.

- ___ c. Adjust R5 at rear of percentage meter, if necessary, to obtain percentage meter indication of 0. Access to R5 requires removing retaining screw from power distribution box, swinging power box outward, and removing box top plate.
- ___ 9. Adjust -2.2 V as follows:
- ___ a. Set METER SELECT switch to -2.2 V.
 - ___ b. Turn -2.2 V adjust knob on front of power distribution box slowly until multimeter indicates a nominal 2.2 V.
 - ___ c. Adjust R4 at rear of percentage meter, if necessary, to obtain percentage meter indication of 0. Access to R4 requires removing retaining screw of power distribution box, swinging box outward, and removing box top plate.

APPLY POWER AND ADJUST VOLTAGES FOR CM (Cont'd)

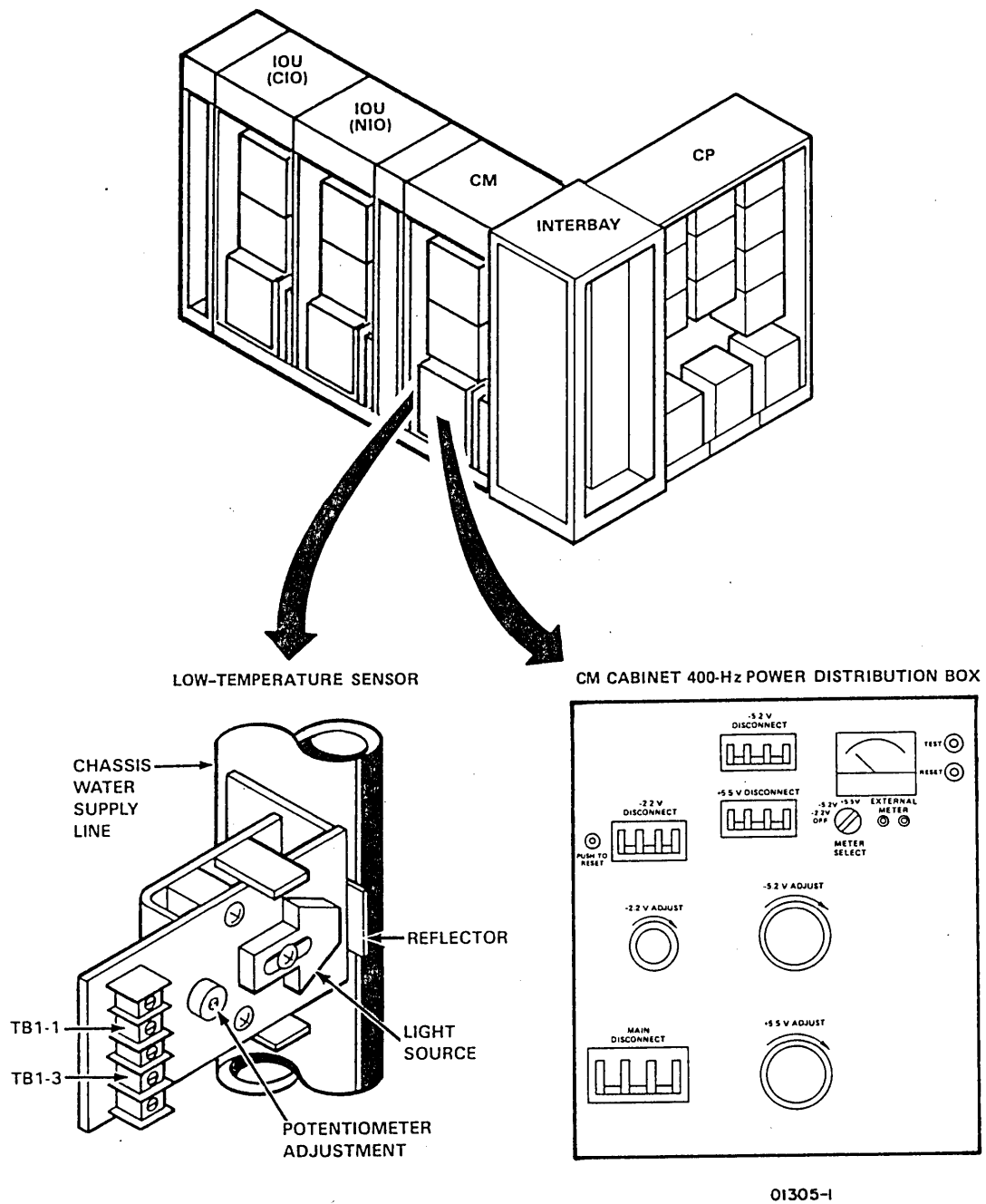


Figure 3-53. CM Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 30 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CM (Cont'd)

- ___ 10. Adjust +5.5 V as follows:
 - ___ a. Set METER SELECT switch (figure 3-54) to +5.5 V.
 - ___ b. Turn +5.5 V adjust knob on front of power distribution box slowly until multimeter indicates a nominal 5.5 V.
 - ___ c. Adjust R6 at rear of percentage meter, if necessary, to obtain percentage meter indication of 0. Access to R6 requires removing retaining screw of power distribution box, swinging box outward, and removing box top plate.
- ___ 11. Disconnect multimeter from power distribution box.
- ___ 12. Check low-temperature sensor voltage and, if necessary, adjust it as follows:
 - ___ a. Set multimeter to a scale that measures 10 V dc.

CAUTION

Place multimeter leads lightly on TBl to prevent bending of the low-temperature sensor and a possible erroneous voltage reading.

- ___ b. Place meter negative lead (-) on low-temperature sensor TBl-1 and positive lead (+) on TBl-3.
- ___ c. Check to see that multimeter reading is from 9.9 V dc to 10.1 V dc. If voltage is not within this range, correct it by adjusting potentiometer on low-temperature sensor.
- ___ d. Remove multimeter leads from TBl.
- ___ 13. Set mode switch on top of power distribution box to REMOTE.
- ___ 14. Close power distribution box, if open, and install retaining screw.
- ___ 15. Observe voltage output of M-G set at DATA display on system power monitor (SPM).

If voltage output is between 118 V and 120 V, go to next step.

If voltage output is incorrect, adjust VOLTAGE ADJUST screw on front of SPM. Then recheck and adjust cabinet logic voltages as necessary. Repeat this action until M-G voltage and logic voltages are correct.

APPLYING SYSTEM POWER (Sheet 31 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CM (Cont'd)

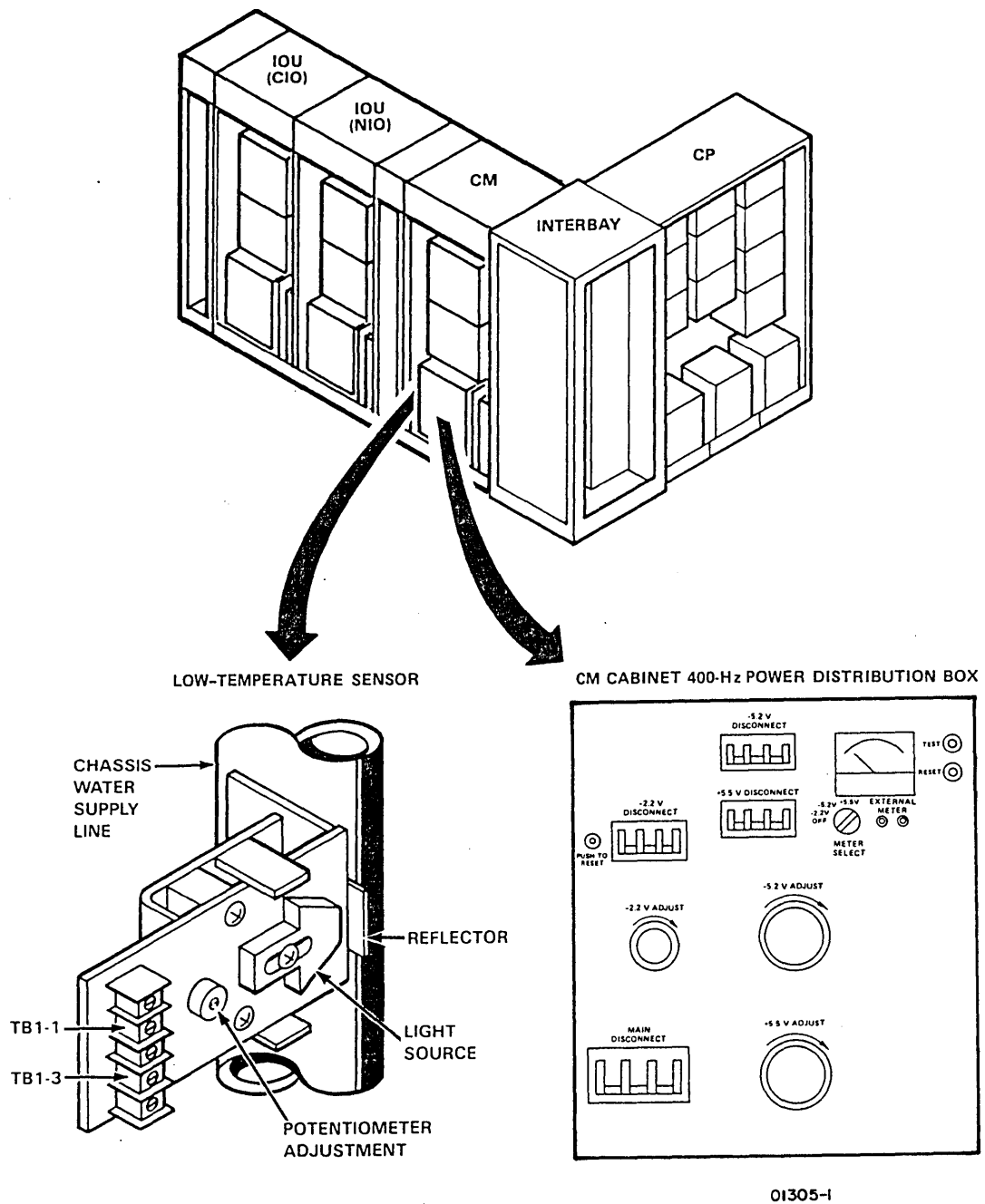


Figure 3-54. CM Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 32 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CM (Cont'd)

- ___ 16. Read CHASSIS WATER TEMPERATURE gauge on each water cooling unit. Verify that gauge indicates between 16.7 °C and 21.5 °C (62 °F and 65 °F), 18.3 °C (63 °F) nominal. If gauge does not indicate a temperature within this range, turn water cooling unit TEMPERATURE CONTROL knob counterclockwise to decrease temperature and clockwise to increase temperature. Wait 15 min for temperature change to register accurately on gauge.
- ___ 17. Record time on flowchart for applying system power.

RECHECKING WATER FLOW RATES (Sheet 1 of 1)

Use this procedure to recheck the initial settings of the water flow rates through the central memory and central processor columns. This recheck is necessary after stabilization of the water flow through the central computer.

Procedure prerequisite:

- All previous procedures have been performed.

Procedure:

- ___ 1. Check to ensure that water flow meters on under-floor water manifolds have following flow rates:
 - ___ a. CP-0 and CP-1 column 1 flow rates are 11.3 L (3 gal) per min.
 - ___ b. CP-0 and CP-1 column 2 flow rates are 11.3 L (3 gal) per min.
 - ___ c. CP-0 and CP-1 column 3 flow rates are 15.1 L (4 gal) per min.
 - ___ d. CM flow rate is 7.6 L (2 gal) per min.
 - ___ e. IOU NIO cabinet 15.1 L (4 gal) min.
 - ___ f. IOU CIO cabinet 15.1 L (4 gal) min.
 - ___ g. Adjust control valves as necessary to correct water flow rates.
- ___ 2. Install all covers on flow meters.
- ___ 3. Check water cooling unit for following gauge readings:
 - ___ a. PUMP OUTLET PRESSURE gauge *GH 251-C HIGHER NORMAL PRESSURE 70 - 95*
For 60-Hz power, 27 psi to 55 psi.
For 50-Hz power, 50 psi to 60 psi.
 - ___ b. CHASSIS WATER TEMPERATURE gauge has a reading of 16.7 °C to 18.3 °C (62 °C to 65 °F).
 - ___ c. CHILLED WATER TEMPERATURE gauge has a reading of 4.4 °C to 10.0 °C (40 °F to 50 °F).

Make any necessary adjustments to obtain correct pressure and temperature. These adjustments are described in an earlier procedure in this section, Check Water Cooling Temperature.

Installation of the central computer requires two installers and an electrician who makes wired power connections. The installers and the electrician each use individual sections of this manual to perform tasks shown on an installation and checkout flowchart. This flowchart directs each installer through coordinated installation tasks in minimal time.

The installer 2 tasks identified on the flowchart and detailed in this section are these:

- Uncrating, checking for damage, and verifying shipping lists
- Placing cabinets
- Bolting cabinets
- Installing display terminal or station
- Connecting CP cables
- Checking cabinet initial conditions
- Applying system power
- Rechecking water flow rates

Tools and parts required for the tasks include the following:

- Diagonal cutter or knife
- Two Rol-a-lifts
- Two cam-action rollers
- Two heavy-gauge steel plates
- Bolting hardware: 1/4-20 bolts, 1/2-in and 1-in long; 1/4-20 nuts
- Two 3/8-in-drive socket wrench sets
- Drift pin
- Two local terminal signal cables
- Clock terminator plugs PN 53695211, as required
- Emergency off jumper plug PN 53582695
- Slotted screwdriver
- Phillips screwdriver
- Digital multimeter
- Calibrated temperature probe for digital multimeter

- Paper tissues or a cloth towel
- Adjustable wrench
- 1/4-in refrigeration wrench
- 5/16-in refrigeration wrench
- CYBER Initialization Package (CIP) User's Handbook
- Antistatic wrist strap
- Antistatic smock

UNCRATING, CHECKING FOR DAMAGE, AND VERIFYING SHIPPING LISTS (Sheet 1 of 3)

Use this procedure to remove delivered central computer units from their containers. Check each unit for any shipping damage, and verify the presence of all parts by comparing them to the shipping lists that arrive with the units. Table 4-1 is an example of a shipping list. Because the table is only an example, it may vary from the actual shipment and must not be used to verify a complete shipment or to order parts.

NOTE

Perform this procedure with installer 1.

Depending upon the available site space, it may be advantageous to perform the uncrating after the placement of each central computer unit.

Uncrating and placement of the central computer units are interactive procedures. Read and become familiar with both before proceeding.

Tool required:

- Diagonal cutter or knife

Procedure:

- ___ 1. Follow directions on labels of shipping containers for initial placement of equipment at site.
- ___ 2. Remove and read any special uncrating instructions and shipping lists attached to outer surfaces of shipping containers.

WARNING

Use caution when cutting shipping bands from containers to prevent the bands from snapping outward and causing personal injury.

CAUTION

It is essential to wear an antistatic smock throughout the installation as a protective measure to prevent damage to microcircuits.

UNCRATING, CHECKING FOR DAMAGE, AND VERIFYING SHIPPING LISTS (Sheet 2 of 3)

- ☐ 3. Open and remove shipping containers. Use a plastic shipping cover from one unit as a refuse container for scrap shipping materials.
- ☐ 4. Inspect units for damage.
- ☐ 5. Compare contents of containers with shipping lists. Report any missing containers, parts, or damage promptly to carrier and to Control Data.
- ☐ 6. Record time on flowchart for uncrating, checking for damage, and verifying shipping lists.

UNCRATING, CHECKING FOR DAMAGE, AND VERIFYING SHIPPING LISTS (Sheet 3 of 3)

Table 4-1. Shipping List Example for Dual CP

Container Number	Container Contents	Part Number	Quantity
1	Central Processor Cabinet AD112-C and Interbay GH480-A	---	1
2	Central Processor Cabinet AD113-A, applies to model 860A only	---	1
3	Central Memory Cabinet BS213-A and Input/Output Unit AT478-A NIO Cabinet	---	1
4	Optional input/output unit AT481-A NIO cabinet	---	1
5	Water Cooling Unit GH251-C	---	1
6	Optional Water Cooling Unit GH251-C	---	1
7	Miscellaneous items kit	---	1
	Cam	10130148	6
	Manual kit	21989674	1
	Diagnostic kit (CIP)		1
	Special reporting book (QSA)		1
	Bolt 1/4 x 1/2	00860332	6
	Bolt 1/4 x 1	00860336	24
	Bolt 1/4 x 1 1/4	00860337	2
	Bolt 1/4 x 1 1/2	00860338	6
	Nut 1/4	00860104	6
	EMC clips	65864100	10
	Marker - Tie	18874300	24
	Wrist strap	23050903	2
	Wrist strap cable	23050904	2
8	Display Station CC545-F	---	1
9	Display station supplemental kit AU109-A05:	---	1
	Chair	23034600	1
	Coax cable 19.8 m (65 ft)	19191600	2

PLACING CABINETS (Sheet 1 of 4)

Use this procedure to place the central computer cabinets and water cooling unit(s) at predesignated floor locations. These floor locations define power and cooling cutouts and the central computer cabinet outline, placed during preinstallation. This procedure provides an order of placing the cabinets for an efficient installation. In some installations, the locations of walls and the spacing of other equipment at the site may require that the installers vary the order of cabinet placement. Bolting the cabinets together occurs after their placement.

NOTE

Perform this procedure with installer 1.

Procedure prerequisites:

- Level floor
- Cutouts in the raised-floor tiles for power and cooling connections
- A floor outline that defines the cabinet placements

Equipment required:

- Two Rol-a-lifts
- Two cam-action rollers, required only for placement of optional CP-1 and optional IOU CIO cabinets
- Two heavy-gauge steel plates for use with cam-action rollers, required only for placement of optional CP-1 and optional IOU CIO cabinets

CAUTION

Insert Rol-a-lifts into cutouts in cabinet frames, not at bottom edges of cabinet end panels. End panels do not require removal when using the Rol-a-lifts.

WARNING

When moving a unit with Rol-a-lifts, use care to prevent wheels from rolling into a floor cutout. When it is necessary to move a Rol-a-lift over a floor cutout, temporarily replace the cutout tile(s) with uncut tile(s).

PLACING CABINETS (Sheet 2 of 4)

Procedure:

- ___ 1. Place CM and IOU NIO cabinets (figure 4-1), using two Rol-a-lifts with padding between upper parts of Rol-a-lifts and cabinet to protect cabinet.
- ___ 2. Place CP-0 and interbay cabinet, using two Rol-a-lifts.
- ___ 3. Remove interbay braces. Store braces for future use in moving cabinets.

IS OPTIONAL CP-1 PART OF INSTALLATION?

- If yes, go to step 4.
- If no, go to next question.

- ___ 4. Place optional CP-1 as follows:
 - ___ a. Use two Rol-a-lifts to move CP-1 close to and in alignment with interbay cabinet.
 - ___ b. Remove Rol-a-lift between CP-1 and interbay cabinets.
 - ___ c. Install a cam-action roller on each side of CP-1 cabinet (figure 4-1). Place a heavy-gauge steel plate under each roller to protect floor.
 - ___ d. Move CP-1 cabinet next to interbay cabinet, one installer operating each cam-action roller and one the remaining Rol-a-lift.

IS IOU CIO CABINET PART OF INSTALLATION?

- If yes, go to step 5.
- If no, go to step 6.

PLACING CABINETS (Sheet 3 of 4)

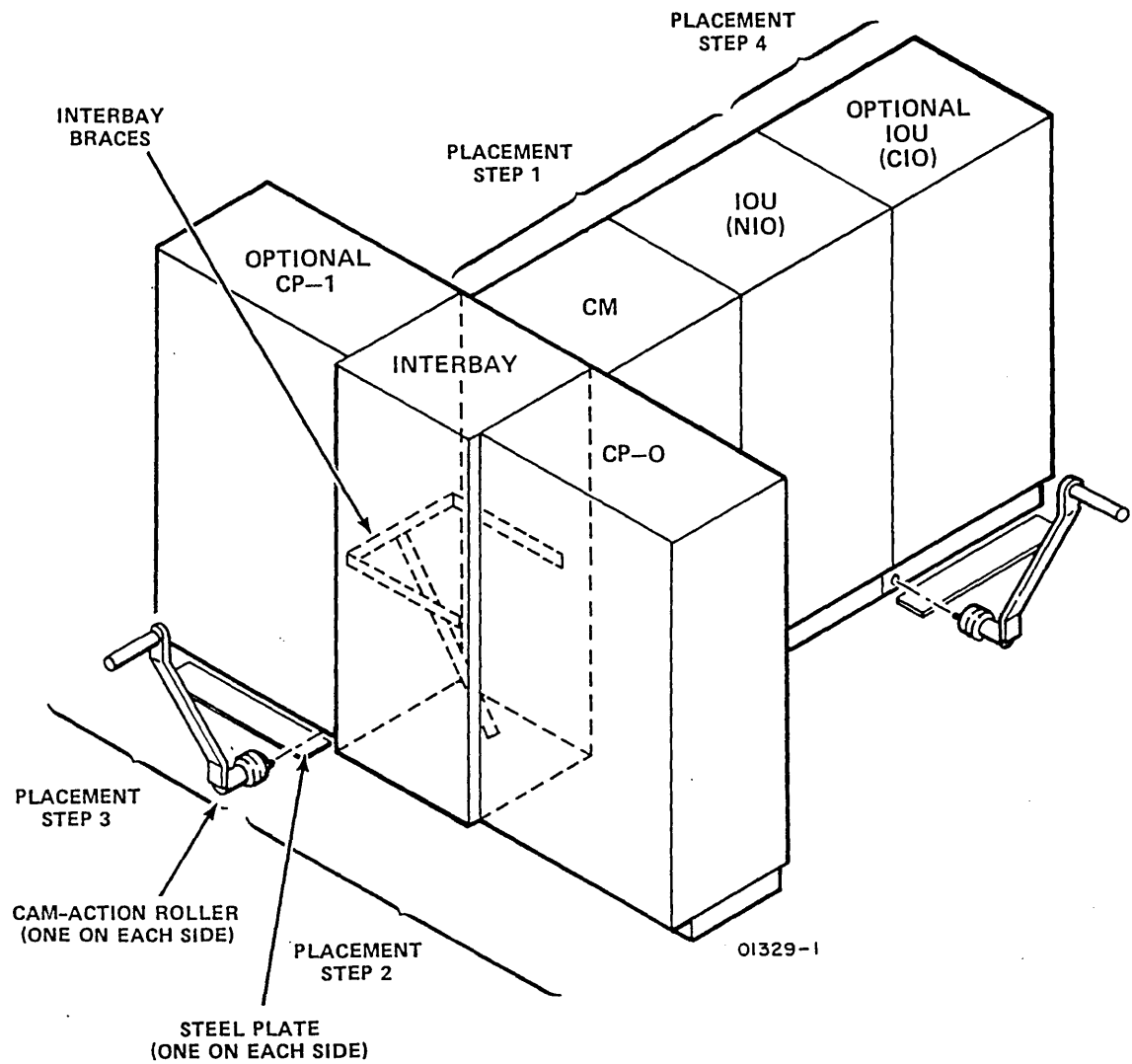


Figure 4-1. Cabinet Placements

PLACING CABINETS (Sheet 4 of 4)

- ___ 5. Place IOU CIO section as follows:
- ___ a. Use two Rol-a-lifts to move IOU CIO cabinet close to and in alignment with IOU NIO cabinet.
 - ___ b. Remove Rol-a-lift between NIO and CIO cabinets.
 - ___ c. Install a cam-action roller on each side of CIO cabinet. Place a heavy-gauge steel plate under each roller to protect floor.
 - ___ d. Move CIO cabinet next to NIO cabinet with one installer operating each cam-action roller and one on the Rol-a-lift.
- ___ 6. Remove each of the central computer doors as follows:
- ___ a. Open door and lift it upward.

WARNING

To prevent bending of the top door hinge pin, do not tilt the door more than necessary during its removal.

- ___ b. Tilt bottom of door slightly to one side, just enough to clear bottom hinge pin.
 - ___ c. Lower door off of top hinge pin.
- ___ 7. Place each water cooling unit at its designated location, using two Rol-a-lifts.
- ___ 8. Remove any wood bracing, installed for shipping purposes, from inside water cooling unit(s).
- ___ 9. Record time on flowchart for placing cabinets.

BOLTING CABINETS (Sheet 1 of 4)

Use this procedure to bolt individual cabinets of the central computer together.

NOTE

Perform this procedure with installer 1.

Procedure prerequisite:

- All central computer cabinets are in place and in alignment with the floor outline and with each other.

Equipment and parts required:

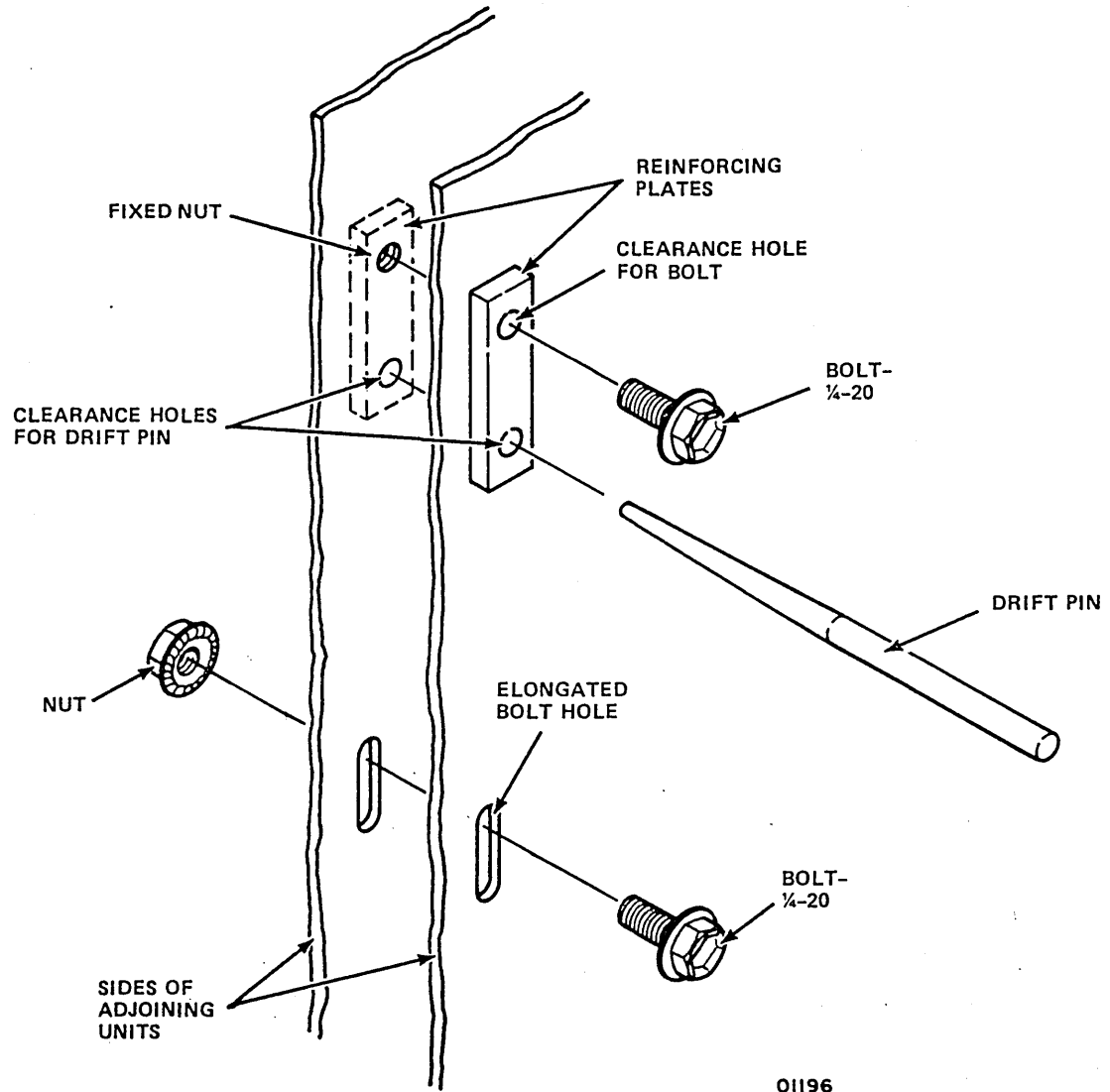
- Bolting hardware: 1/4-20 bolts, 1/2 in and 1 in long; 1/4-20 nuts (shipped with cabinets)
- Two 3/8-in-drive socket wrench sets, one for each installer
- Drift pin

General procedure:

NOTE

Use the following substeps for bolting any two cabinets together.

- ___ 1. Align bolt holes of two cabinets, using drift pin if necessary (figure 4-2).
- ___ 2. Install bolts in fixed-nut locations first according to the instructions that follow.



NOTE:
DRIFT PIN HOLES MAY BE LOCATED BESIDE
RATHER THAN BENEATH THE BOLT HOLES.

Figure 4-2. Cabinet Bolting Methods

BOLTING CABINETS (Sheet 3 of 4)

Procedure:

- ___ 1. Bolt CM cabinet to interbay cabinet at two lower fixed-nut locations and two upper loose-nut locations shown in figure 4-3, bolting step 1.
- ___ a. Install bolts loosely.
- ___ b. Push in any EMC shielding that may have squeezed out from cabinet edges.
- ___ c. Tighten bolts, using socket wrench.

IS IOU CIO CABINET PART OF INSTALLATION?

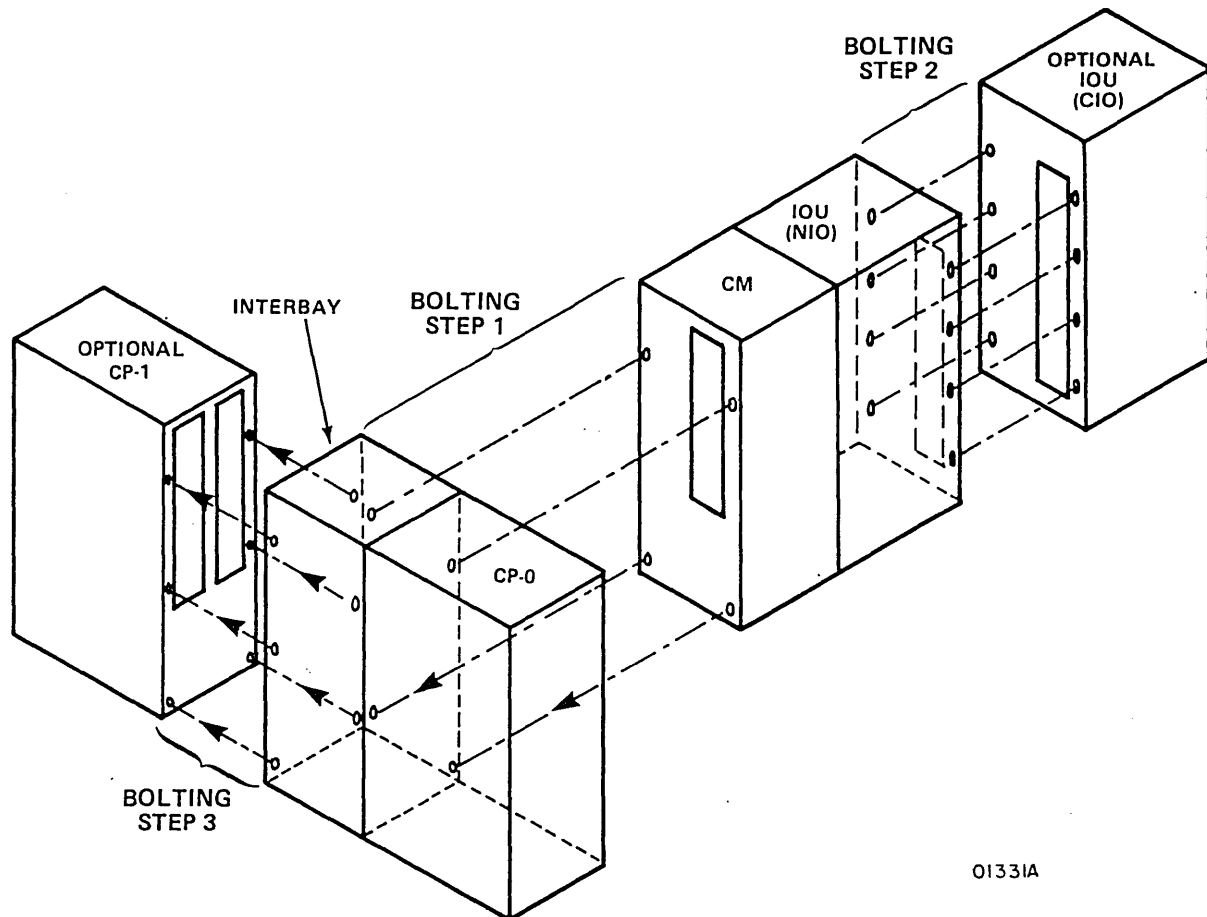
- If yes, go to step 2.
- If no, go to next question.

- ___ 2. Bolt IOU CIO cabinet to IOU NIO cabinet at eight loose-nut locations shown in figure 4-3, bolting step 2.
- ___ a. Install bolts loosely.
- ___ b. Push in any EMC shielding that may have squeezed out from cabinet edges.
- ___ c. Tighten bolts.

IS OPTIONAL CP-1 PART OF INSTALLATION?

- If yes, go to step 3.
- If no, go to step 4.

- ___ 3. Bolt optional CP-1 cabinet to interbay cabinet at six fixed-nut locations shown in figure 4-3, bolting step 3.
- ___ a. Install bolts loosely.
- ___ b. Push in any EMC shielding that may have squeezed out from cabinet edges.
- ___ c. Tighten bolts.
- ___ 4. Look for gaps between cabinets. If there are any gaps of 6 mm (0.25 in) or more, use additional bolts and nuts in auxiliary holes to draw cabinets together.
- ___ 5. Record time on flowchart for bolting cabinets.



NOTES:

1. CENTER LINES WITH ARROWS (→) SHOW LOCATIONS AND DIRECTIONS OF BOLTS INTO FIXED NUTS.
2. CENTER LINES WITHOUT ARROWS SHOW LOCATIONS OF BOLTS AND NUTS INSTALLED FROM EITHER DIRECTION.
3. USE 1-INCH LENGTH ¼-20 BOLTS FOR STEPS 1 AND 2.
USE ½-INCH LENGTH ¼-20 BOLTS FOR STEP 3.

Figure 4-3. Cabinet Bolt Locations

INSTALLING DISPLAY TERMINAL OR STATION (Sheet 1 of 3)

Depending on the site equipment configuration, the equipment installation includes either a CC634-B Display Terminal, a CC545-C, D, E, or F Display Station, or both. The installations include the following tasks:

- Connect CC634-B display terminal.
- Connect CC545-C, D, E, or F display station.

CONNECT CC634-B DISPLAY TERMINAL

Use this procedure to connect both power and data cables to the CC634-B Display Terminal.

Procedure prerequisites:

- A 50/60-Hz power outlet is installed at the display terminal location.
- A signal cable (PN 19268593B) has been ordered and is available.

Equipment required:

- CYBER Initialization Package (CIP) User's Handbook

Procedure:

- ___ 1. Refer to the Control Data 721-21/31 Owner's Manual (publication no. 62950101) for power connection details and cautions. Manual is shipped with display terminal.
- ___ 2. Connect signal cable between display terminal and IOU TERMINAL 0 connector.
- ___ 3. Refer to appendix in CYBER Initialization Package (CIP) User's Handbook for display terminal setup.

INSTALLING DISPLAY TERMINAL OR STATION (Sheet 2 of 3)

CONNECT CC545-C, D, E, OR F DISPLAY STATION

Use this procedure to connect a signal cable from the central computer IOU to the CC545-C, D, E, or F display station.

Additional installation and checkout procedures for these display stations are in the hardware reference customer engineering manual listed in the preface of this manual.

NOTE

Power connections are wired to the display station power input box. These connections require an electrician and are covered in the procedures for the installation electrician in section 5 of this manual.

Parts required:

- Two local terminal signal cables

Procedure:

- ___ 1. Place display station over its precut cable cutout in raised floor.
- ___ 2. Place two signal cables under raised floor between IOU NIO cabinet and display station.

NOTE

Left side panel of display station should be removed as a result of earlier power connections by an electrician.

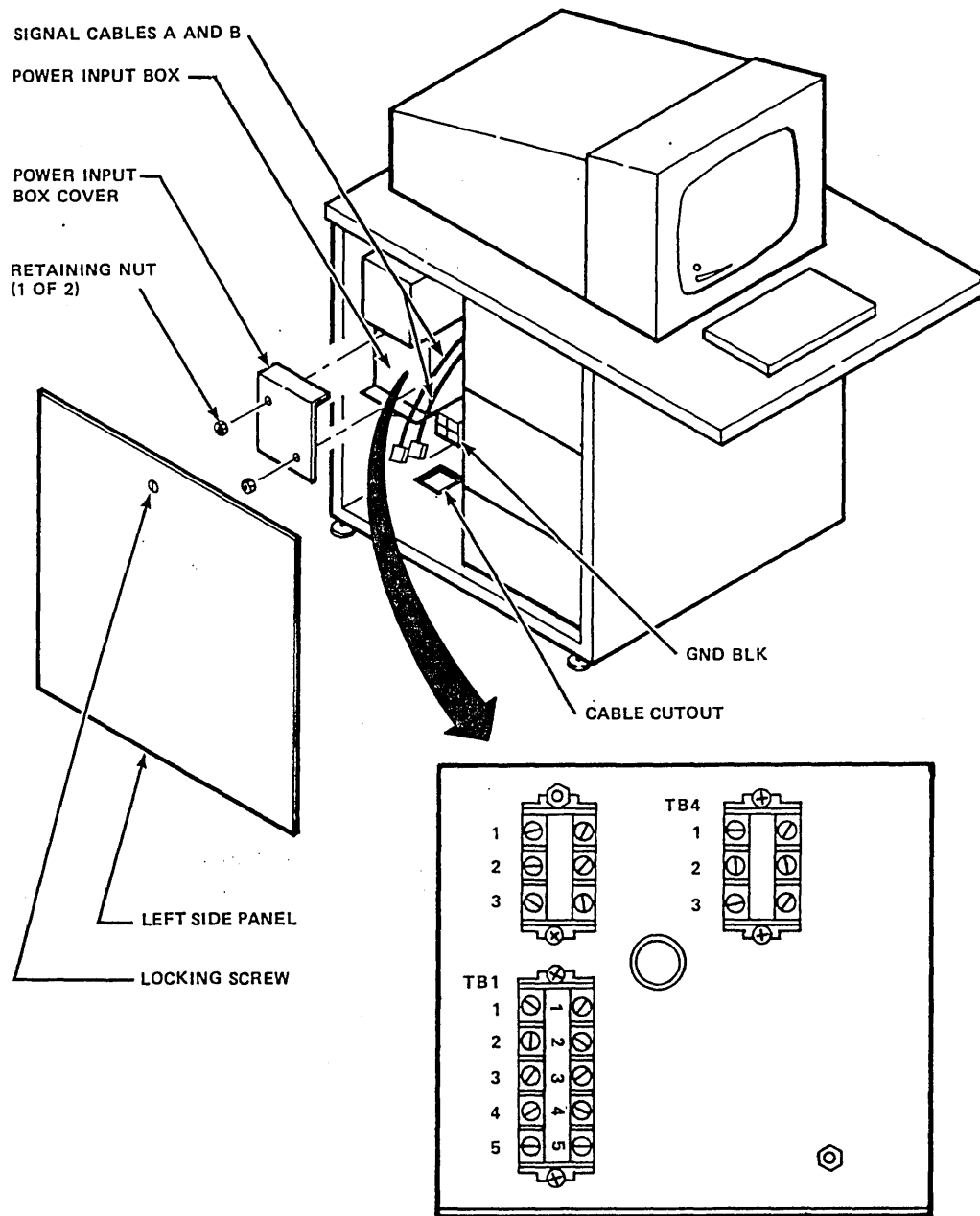
- ___ 3. Pull signal cables from up through floor and cable cutouts for IOU NIO cabinet and display station (figure 4-4).
- ___ 4. Connect cables as follows:

<u>IOU Cable</u>		<u>Display Station</u>
CHANNEL 10 IN	to	CABLE A
CHANNEL 10 OUT	to	CABLE B

- ___ 5. Install left side panel on display cabinet.

INSTALLING DISPLAY TERMINAL OR STATION (Sheet 3 of 3)

CONNECT CC545-C, D, E, OR F DISPLAY STATION (Cont'd)



01328

Figure 4-4. Display Station Signal Cable Connections

CONNECTING CP CABLES (Sheet 1 of 27)

These cable connections consist of the following procedures:

- Connect CP-0 and CP-1 cables to IOU backpanel A.
- Connect CP-0 CMC cables to CM.
- Connect CP-1 local memory cables to CP-0 CMC.
- Connect CM cable to CP-1 ZIF cage.
- Connect clock cables.
- Connect fault-sense cables to CM multiplexer board.
- Connect IOU CIO cables to NIO connector panel.
- Connect system power monitor cables.

NOTE

Removal of three shipping braces from the interbay may make certain cabling procedures easier. If these braces are removed, store them inside interbay. These braces must be installed prior to any future movement of the CP-0 and interbay cabinets.

CONNECTING CP CABLES (Sheet 2 of 27)

CONNECT CP-0 AND CP-1 CABLES TO IOU BACKPANEL A

Use this procedure to route and connect CP-0 cables from their shipping location in the interbay cabinet to the IOU (NIO section) backpanel A.

Tools required:

- Diagonal cutter
- Antistatic wrist strap

Procedure:

CAUTIONS

Use an antistatic wrist strap when connecting all data cables. This is essential for preventing damage to microcircuits.

Use care in handling and connecting all cables to prevent damage to the cable connections on the connectors and to the connector pins and jacks.

- ___ 1. Connect an antistatic wrist strap to wrist and to frame ground wire.
- ___ 2. Locate seven black-sheathed cables inside interbay cabinet. They originate from CP-0 and have unconnected ends with connectors labeled J50 through J67.
- ___ 3. Cut shipping restraints from these cables.
- ___ 4. Route cables through CM and IOU cabinet openings to IOU (NIO section) backpanel A. Route only enough of cables to reach backpanel (figure 4-5).
- ___ 5. Place cables in support hangers located near IOU cabinet opening.

CONNECTING CP CABLES (Sheet 3 of 27)

CONNECT CP-0 AND CP-1 CABLES TO IOU BACKPANEL A (Cont'd)

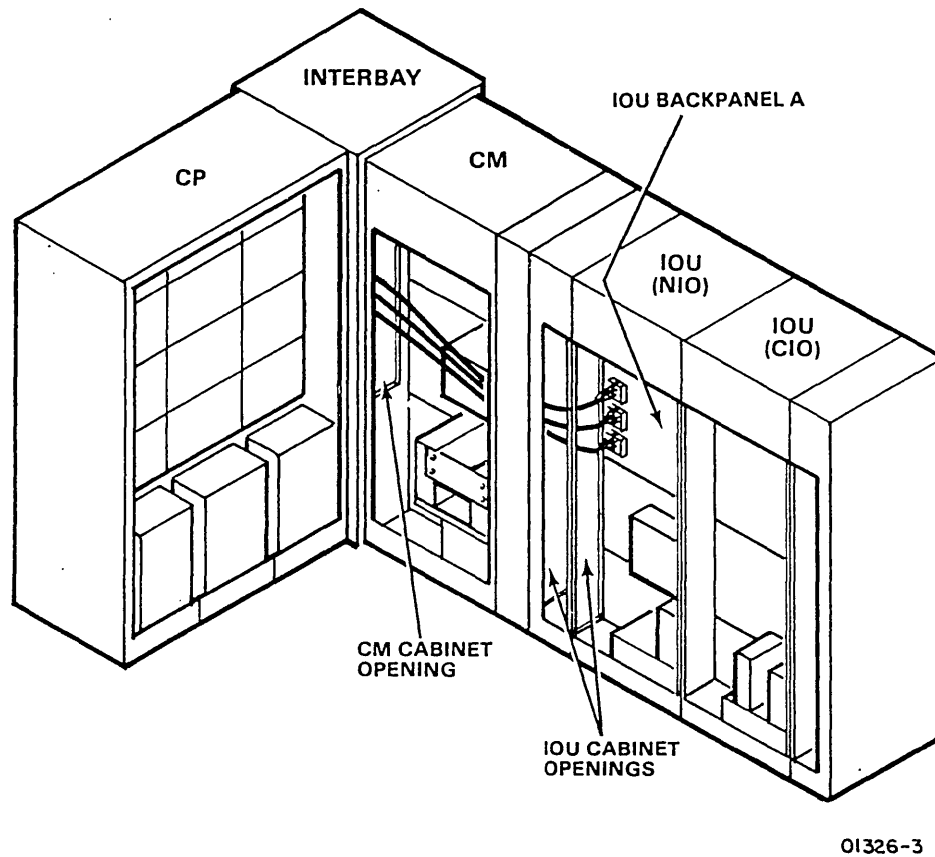


Figure 4-5. CP-0 Cables to IOU Backpanel A Cable Connections

CONNECTING CP CABLES (Sheet 4 of 27)

CONNECT CP-0 AND CP-1 CABLES TO IOU BACKPANEL A (Cont'd)

___ 6. Connect connectors J50 through J67 in order and manner listed in table 4-2.

Table 4-2. IOU Backpanel A Cable Connections

Connector Designators on CP-0 Cable Ends		Connector Designators on Backpanel A	
J67	to	J67	
J66	to	J66	
J65	to	J65	
J64	to	J64	
J63	to	J63	
J62	to	J62	
J61	to	J61	
J60	to	J60	
J59	to	J59	
J58	to	J58	
J57	to	J57	
J56	to	J56	
J55	to	J55	
J54	to	J54	
J53	to	J53	
J52	to	J52	
J51	to	J51	
J50	to	J50	
NOTES:			
1. For all odd numbered connectors, connect signal wires to column A, and braided ground wires to column C.			
2. For all even numbered connectors, connect signal wires to column B, and braided ground wires to column D.			
3. Connecting cables in the order shown in the table is the most efficient order of connection.			

CONNECTING CP CABLES (Sheet 5 of 27)

CONNECT CP-0 AND CP-1 CABLES TO IOU BACKPANEL A (Cont'd)

- ___ 7. Locate cable, consisting of white and orange twisted-pair wires, inside interbay cabinet with unconnected connector labeled J70. Other end of this cable originates at CP-0 ZIF cage locations C1AD3, C1AD4, and C1AD5.
- ___ 8. Route cable through CM to IOU backpanel A. Route only enough cable to reach backpanel (figure 4-6).
- ___ 9. Connect J72 to IOU backpanel A, connector J70, positioning connector so that its white wires are on the B pin column and its orange wires are on the A pin column.

IS CP-1 PART OF INSTALLATION?

- If yes, go to step 9.
- If no, go to next procedure.

- ___ 10. Locate cable, consisting of white and orange twisted-pair wires, inside CP-1 cabinet with unconnected connector labeled J72. Other end of this cable originates at CP-1 ZIF cage locations C1AD3, C1AD4, and C1AD5.
- ___ 11. Route cable through interbay and CM to IOU backpanel A. Route only enough cable to reach backpanel.
- ___ 12. Connect J72 to IOU backpanel A, connector J72, positioning connector so that its white wires are on the B pin column and its orange wires are on the A pin column.

CONNECTING CP CABLES (Sheet 6 of 27)

CONNECT CP-0 AND CP-1 CABLES TO IOU BACKPANEL A (Cont'd)

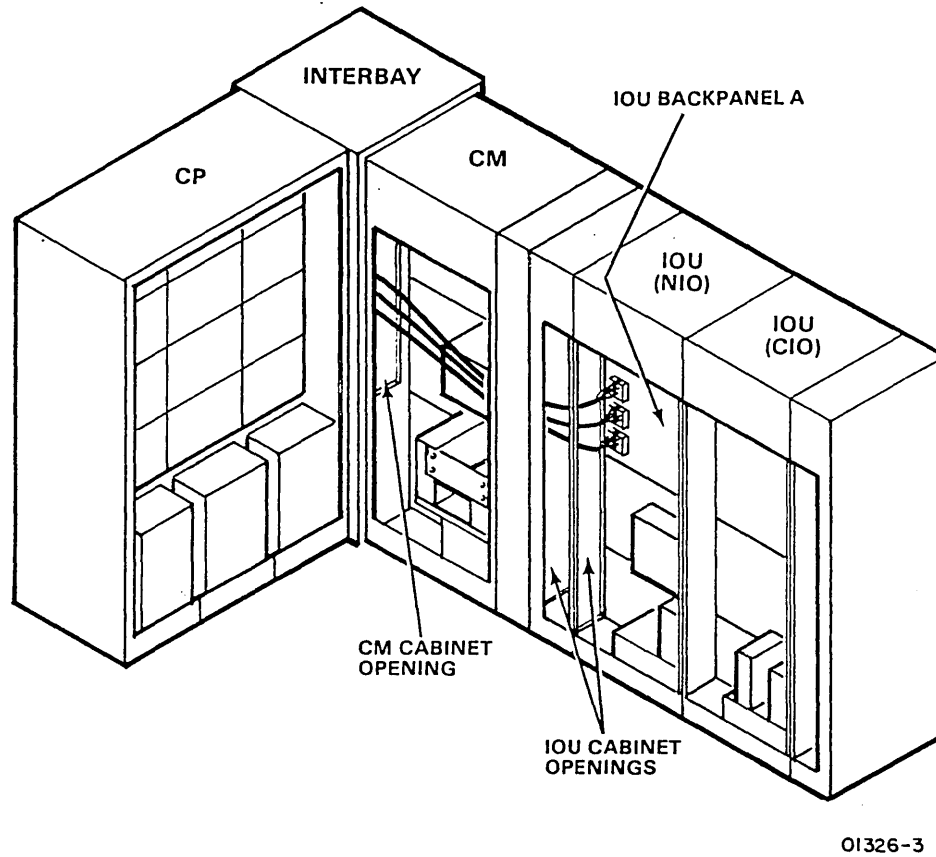


Figure 4-6. CP-0 Cables to IOU Backpanel A Cable Connections

CONNECTING CP CABLES (Sheet 7 of 27)

CONNECT CP-0 CMC CABLES TO CM

Use this procedure to route CP-0 CMC cables from their shipping locations in the interbay to the CM backpanels and to connect the cables to the CM backpanels.

Tools required:

- Diagonal cutter
- Antistatic wrist strap

Procedure:

CAUTIONS

Use an antistatic wrist strap when connecting all data cables. This is essential for preventing damage to microcircuits.

Use care in handling and connecting all cables to prevent damage to the cable connections on the connectors and to the connector pins and jacks.

- ___ 1. Connect an antistatic wrist strap to wrist and to frame ground wire.
- ___ 2. Locate cable bundles (in interbay cabinet) that connect to CM backpanels. Connectors on these cables have connector destination labels listed in table 4-3.
- ___ 3. Cut shipping restraints from cable bundles.
- ___ 4. Route cables for CM backpanel B through cabinet opening (figure 4-7). Route only enough of cables to reach backpanel.

CAUTION

To prevent damage to the CM backpanel connectors, make sure that mating cable connectors are properly seated in the backpanel connectors. Push the cable connectors into the backpanel connectors firmly until the connectors snap twice. Under no circumstances use the backpanel connector clamps to aid in the insertion or extraction of their mating connectors.

CONNECTING CP CABLES (Sheet 8 of 27)

CONNECT CP-0 CMC CABLES TO CM (Cont'd)

- ___ 5. Connect cables to destinations on CM backpanel B, shown in table 4-3. Connect bottom (lower) cables first, using care to prevent bending of connector pins.
- ___ 6. Route cables for CM backpanel A through opening. Route only enough of cables to reach backpanel.
- ___ 7. Connect cables to destinations on CM backpanel B, shown in table 4-3. Connect bottom (lower) cables first, using care to prevent bending of connector pins.

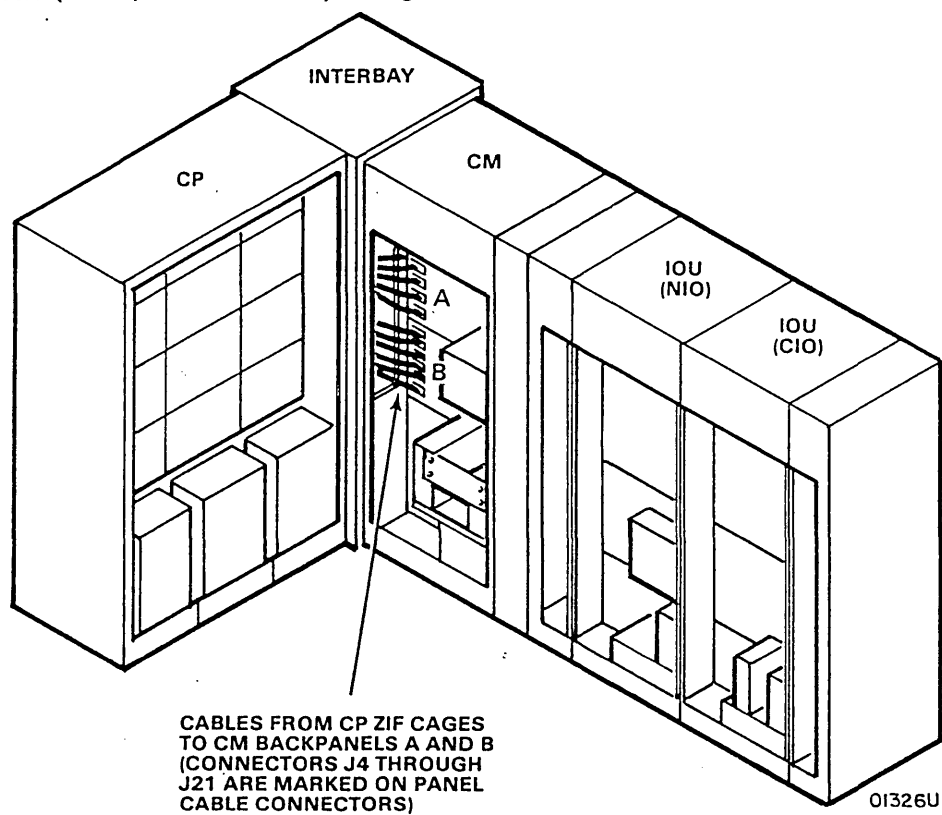


Figure 4-7. CP-0 CMC to CM Cable Connections

CONNECTING CP CABLES (Sheet 9 of 27)

CONNECT CP-0 CMC CABLES TO CM (Cont'd)

Table 4-3. CP-0 to CM Cable Connections

ORIGIN CP-0		DESTINATION CM BACKPANEL B		ORIGIN CP-0		DESTINATION CM BACKPANEL A	
CIAP3	to	BJ24		CIAN3	to	AJ24	
CIAP4	to	BJ23		CIAM3	to	AJ23	
CIAP5	to	BJ22		CIAN4	to	AJ22	
CIAN6	to	BJ21		CIAM4	to	AJ21	
AIAC3 and AIAL4	to	BJ18††		AIAC3	to	AJ18††	
AIAM4	to	BJ17		AIAM4	to	AJ17	
AIAM4	to	BJ16		AIAT4	to	AJ16	
AIAM4	to	BJ15		AIAS4	to	AJ15	
AIAM4	to	BJ14		AIAS5	to	AJ14	
AIAM4	to	BJ13		AIAR5	to	AJ13	
AIAM4	to	BJ12		CIAG3	to	AJ12	
AIAM4	to	BJ11†		AIAT3 and CIAG3†††	to	AJ11†	
AIAM4	to	BJ10		AIAM3	to	AJ10	
AIAM4	to	BJ09		AIAM4	to	AJ09	
CIAM5	to	BJ08		CIAM3	to	AJ08	
CIAM5	to	BJ07		CIAM4	to	AJ07	
CIAM5	to	BJ06		CIAM5	to	AJ06	
CIAM5	to	BJ05		CIAM5	to	AJ05	
AIAM4	to	BJ04		AIAM4	to	AJ04	
AIAM4	to	BJ03		AIAM4	to	AJ03	
AIAM4	to	BJ02		AIAM5	to	AJ02	
AIAM4	to	BJ01		AIAM5	to	AJ01	

†Part of a four-connector cable assembly.

††Part of a five-connector cable assembly.

†††There are two CIAG3 connectors, one for CP-0 and one for CP-1. This one is for CP-1. (Refer to figure 4-8.)

Connector definition example for CIAP3:
C is ZIF cage (A, B, or C).
1 is CP-0 column 1.
A is ZIF cage interconnect board (A or B).
P3 is connector location on interconnect board.

Connector definition example for BJ24:
B is CM backpanel (A or B).
J24 is connector location on backpanel.

CONNECTING CP CABLES (Sheet 10 of 27)

CONNECT CP-0 CMC CABLES TO CM (Cont'd)

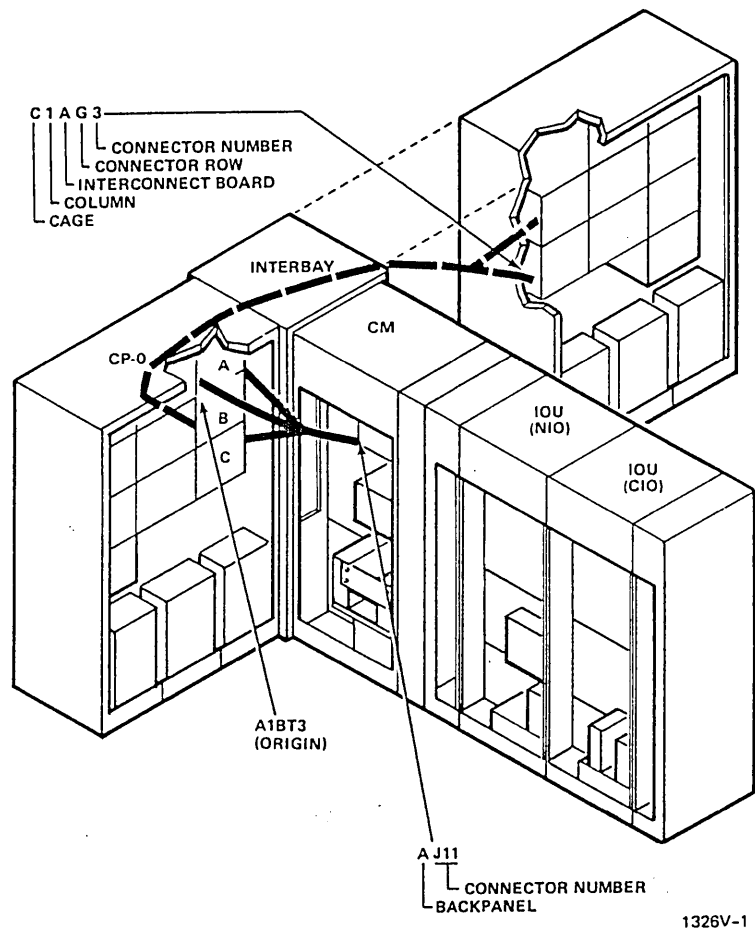


Figure 4-8. CP-0 and CP-1 Long and Short Warning Cable Connections to CM

CONNECTING CP CABLES (Sheet 11 of 27)

CONNECT CP-1 LOCAL MEMORY CABLES TO CP-0 CMC

Use this procedure to connect cables from CP-1 column 1 local memory to the central memory control (port B) in CP-0 Column 1.

IS OPTIONAL CP-1 PART OF INSTALLATION?

- If yes, continue with this procedure.
- If no, go to next procedure.

Tools required:

- Diagonal cutter
- 3/16-in socket wrench
- Antistatic wrist strap

Procedure:

CAUTIONS

Use an antistatic wrist strap when connecting all data cables. This is essential for preventing damage to microcircuits.

Use care in handling and connecting all cables to prevent damage to the cable connections on the connectors and to the connector pins and jacks.

- ___ 1. Connect an antistatic wrist strap to wrist and to frame ground wire.
- ___ 2. Locate cable bundles (in CP-1 column 1) that have CP-0 connector destination labels listed in table 4-4.
- ___ 3. Cut shipping restraints from cable bundles.

CONNECTING CP CABLES (Sheet 12 of 27)

CONNECT CP-1 LOCAL MEMORY CABLES TO CP-0 CMC (Cont'd)

- ___ 4. Route cables from CP-1 through interbay to CP-0 column 1.
- ___ 5. Connect cables to ZIF cages A and C as listed in table 4-4.
 - ___ a. Use a 3/16-in wrench to remove connector retainers to allow cable connections to interconnect boards.
 - ___ b. Plug in connectors with white wires up and orange wires down.
 - ___ c. Install connector retainers.
- ___ 6. Use tie wraps to bundle cables to power bus board to relieve weight of cables from connectors.
- ___ 7. Check all cable connections to CP-0 column 1, ZIF cage interconnect boards, to ensure that connectors fit tightly to boards.

Table 4-4. CP-1 Local Memory Cables to CP-0 CMC

ORIGIN CP-1		DESTINATION CP-0
B1BA3	to	C1AL4
B1BF4	to	C1AL5
B1BW3	to	C1AG4
B1BT3	to	C1AH4
B1BU3	to	C1AJ4
B1BV3	to	C1AK4
B1BW4	to	C1AG5
B1BT4	to	C1AH5
B1BU4	to	C1AJ5
B1BV4	to	C1AK5
B1AH3	to	A1BH4
B1AG3	to	A1BN3
B1AW3	to	A1BH3
B1AT3	to	A1BJ3
B1AU3	to	A1BL3
B1AV3	to	A1BM3
B1AW4	to	A1BJ4
B1AT4	to	A1BK4
B1AU4	to	A1BL4
B1AV4	to	A1BM4
B1AB3	to	A1BN4
Connector definition example for B1AH3:		
B is ZIF cage (A, B, or C).		
1 is CP-0 column 1.		
A is interconnect board (A or B).		
H3 is connector location on interconnect board.		

CONNECTING CP CABLES (Sheet 13 of 27)

CONNECT CM CABLE TO CP-1 ZIF CAGE

Use this procedure to route and connect a single cable from the CM to CP-1 column 1, ZIF cage C. The cable is part of a five-connector cable assembly.

IS OPTIONAL CP-1 PART OF INSTALLATION?

- If yes, continue with this procedure.
- If no, go to next procedure.

Procedure:

- ___ 1. Locate a cable that originates from CM AJ11 and has a label on its unconnected end for CP-1 C1AG3.
- ___ 2. Route cable from CM through interbay and into CP-1.
- ___ 3. Connect cable to C1AG3. Install this connector with its white wires down and black wires up.
- ___ 4. Check all cable connections to CP-1 column 1, ZIF cage interconnect boards, to ensure that connectors fit tightly to boards.

CONNECTING CP CABLES (Sheet 14 of 27)

CONNECT CLOCK CABLES

Use this procedure to route and connect clock cables from CP-0, IOU, and optional CP-1 to the CM cabinet. Clock cables are shipped in the cabinets with one end connected.

Tool required:

- Diagonal cutter

Parts required:

- Clock terminator plugs (PN 53695211), as required
- Antistatic wrist strap

Procedure:

CAUTIONS

Use an antistatic wrist strap when connecting all data cables. This is essential for preventing damage to microcircuits.

Use care in handling and connecting all cables to prevent damage to the cable connections on the connectors and to the connector pins and jacks.

- ___ 1. Connect an antistatic wrist strap to wrist and to frame ground wire.
- ___ 2. Locate two clock cables in interbay cabinet. They originate from CP-0 and have unconnected ends labeled M3CR J42 and M3CR J46.
- ___ 3. Cut any shipping restraints from these cables.
- ___ 4. Route and connect cables to J42 and J46 on CM clock connector panel (figure 4-9).

CONNECTING CP CABLES (Sheet 15 of 27)

CONNECT CLOCK CABLES (Cont'd)

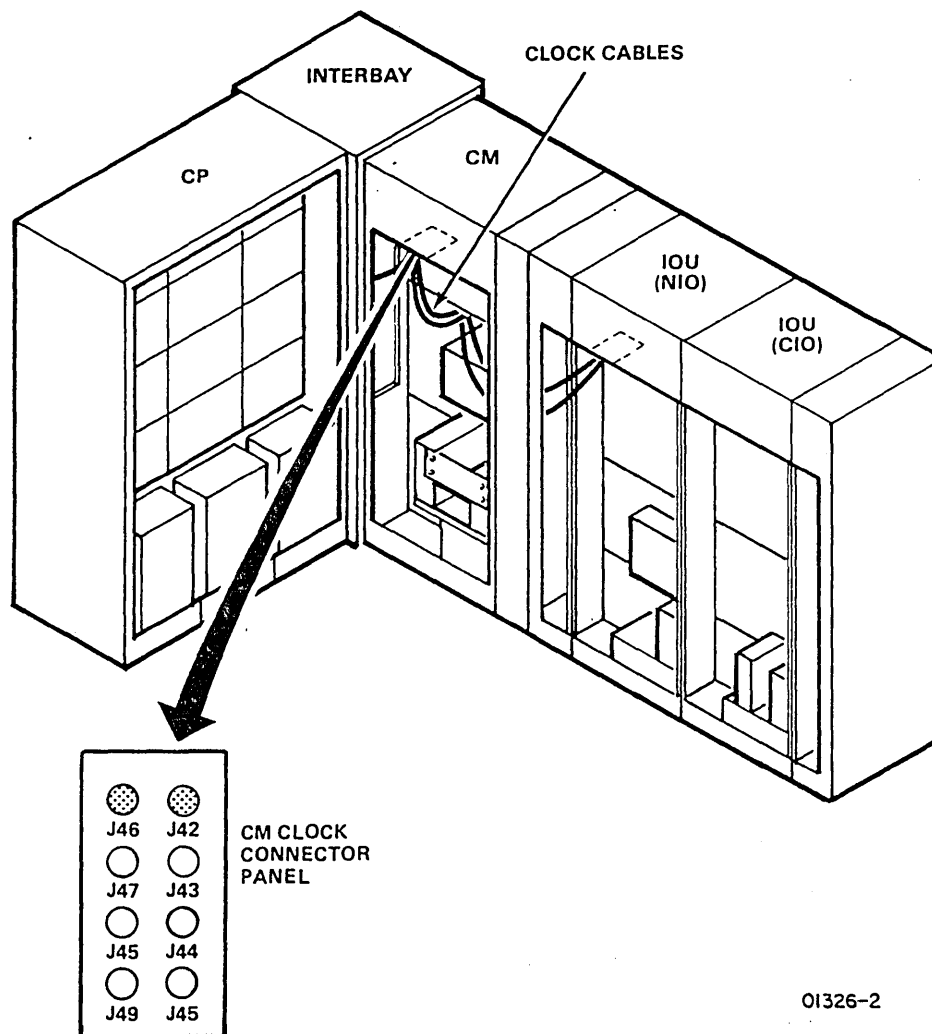


Figure 4-9. Clock Cable Connections

CONNECTING CP CABLES (Sheet 16 of 27)

CONNECT CLOCK CABLES (Cont'd)

IS OPTIONAL CP-1 PART OF INSTALLATION?

- If yes, go to step 5.
- If no, go to step 8.

- ___ 5. Locate two clock cables in CP-1 cabinet. These cables have unconnected ends labeled M3 J43 or M3 J49 and M3 J45.
- ___ 6. Cut any shipping restraints from these cables.
- ___ 7. Route cables through interbay into CM cabinet. Connect them to respectively labeled connectors on CM clock connector panel. If there are terminator plugs on CM clock connector panel connectors J43 or J49 and J45, remove them first.
- ___ 8. Check to ensure that a clock terminator plug is on each unused connector on CM clock connector panel.

CONNECTING CP CABLES (Sheet 17 of 27)

CONNECT FAULT-SENSE CABLES TO CM MULTIPLEXER BOARD

Use this procedure to route and connect the fault-sense cables from column 1 in CP-0, IOU, and column 1 in optional CP-1 to the multiplexer board in the CM cabinet.

Procedure prerequisite:

- Bolting of the central computer units is complete.

Tool required:

- Antistatic wrist strap

Procedure:

CAUTIONS

Use an antistatic wrist strap when connecting all data cables. This is essential for preventing damage to microcircuits.

Use care in handling and connecting all cables to prevent damage to the cable connections on the connectors and to the connector pins and jacks.

- ___ 1. Connect an antistatic wrist strap to wrist and to frame ground wire.
- ___ 2. Locate fault-sense cable from CP-0 in interbay cabinet. Cable has label for CM multiplexer board connector J5.
- ___ 3. Cut any shipping restraints from cable.

CAUTION

Use care to prevent bending or breaking of connector pins on the multiplexer board.

CONNECTING CP CABLES (Sheet 18 of 27)

CONNECT FAULT-SENSE CABLES TO CM MULTIPLEXER BOARD (Cont'd)

- ___ 4. Route cable to CM multiplexer board, and connect it to J5 (figure 4-10). Cable has a keyed connector to ensure correct connection.
- ___ 5. Locate fault-sense cable in IOU NIO cabinet. Cable has label for CM multiplexer board connector J2.
- ___ 6. Route cable to CM multiplexer board, and connect it to J2.

IS OPTIONAL IOU (CIO SECTION) PART OF INSTALLATION?

- If yes, go to step 7.
- If no, go to next question.

- ___ 7. Locate fault-sense cable in IOU CIO cabinet. Cable has label for CM multiplexer board connector J3.
- ___ 8. Route cable to CM multiplexer board, and connect it to J3.

IS OPTIONAL CP-1 PART OF INSTALLATION?

- If yes, go to step 9.
- If no, go to next procedure.

- ___ 9. Locate fault-sense cable in CP-1 cabinet. Cable has label for CM multiplexer board connector J6.
- ___ 10. Route cable through interbay to CM multiplexer board, and connect it to J6.

CONNECTING CP CABLES (Sheet 19 of 27)

CONNECT FAULT-SENSE CABLES TO CM MULTIPLEXER BOARD (Cont'd)

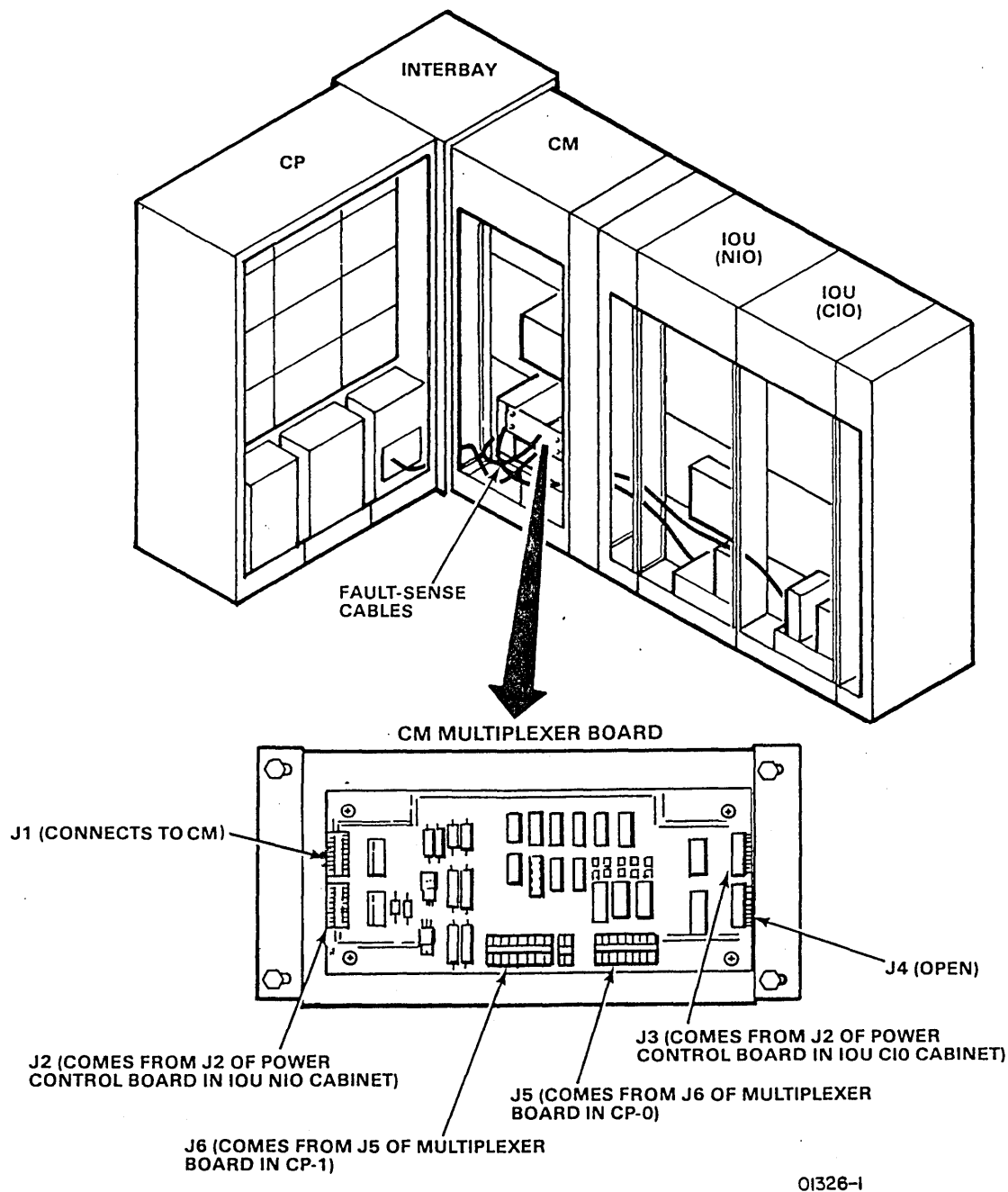


Figure 4-10. Fault-Sense Cable Connections to CM Multiplexer Board

CONNECTING CP CABLES (Sheet 20 of 27)

CONNECT IOU CIO CABLES TO NIO CONNECTOR PANEL

Use this procedure to connect cables from the IOU CIO cabinet to the IOU NIO cabinet.

IS IOU CIO CABINET PART OF INSTALLATION?

- If yes, continue this procedure.
- If no, go to next procedure.

Procedure prerequisite:

- Bolting of the central computer units is complete.

Tools required:

- Antistatic wrist strap
- Diagonal cutter

Procedure:

CAUTIONS

Use an antistatic wrist strap when connecting all data cables. This is essential for preventing damage to microcircuits.

Use care in handling and connecting all cables to prevent damage to the cable connections on the connectors and to the connector pins and jacks.

- ___ 1. Connect an antistatic wrist strap to wrist and to frame ground wire.
- ___ 2. Use diagonal cutter to cut retaining strap from cable shipping bracket and cable J28 at rear of CIO cabinet (figure 4-11).
- ___ 3. Connect cable to J28 on NIO connector panel.
- ___ 4. Cut retaining strap and make similar connection for each remaining cable on shipping bracket, working from bottom connector to top connector.

CONNECTING CP CABLES (Sheet 21 of 27)

CONNECT IOU CIO CABLES TO NIO CONNECTOR PANEL (Cont'd)

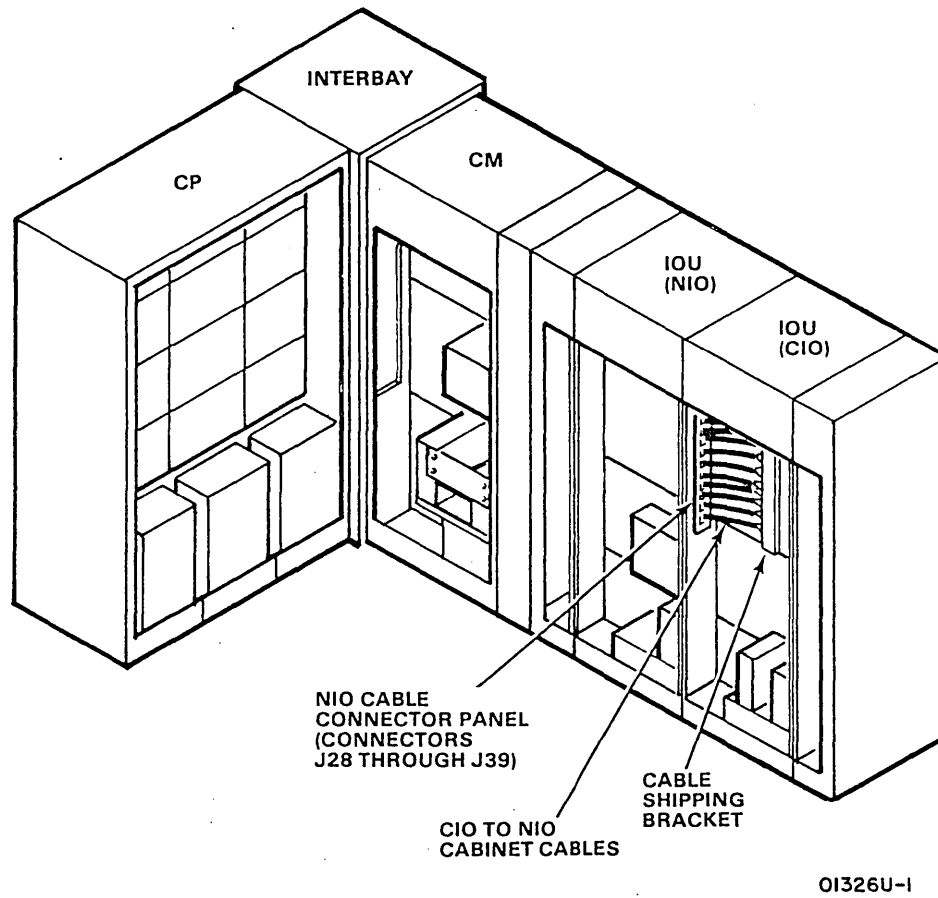


Figure 4-11. IOU CIO Cable Connections

CONNECTING CP CABLES (Sheet 22 of 27)

CONNECT SYSTEM POWER MONITOR CABLES

Use this procedure to connect the status and control cables from the system power monitor (SPM) to the central computer and water cooling unit.

Procedure prerequisite:

- The status and control cables were connected to the SPM, labeled, and routed to the floor cutouts during preinstallation.

Parts required:

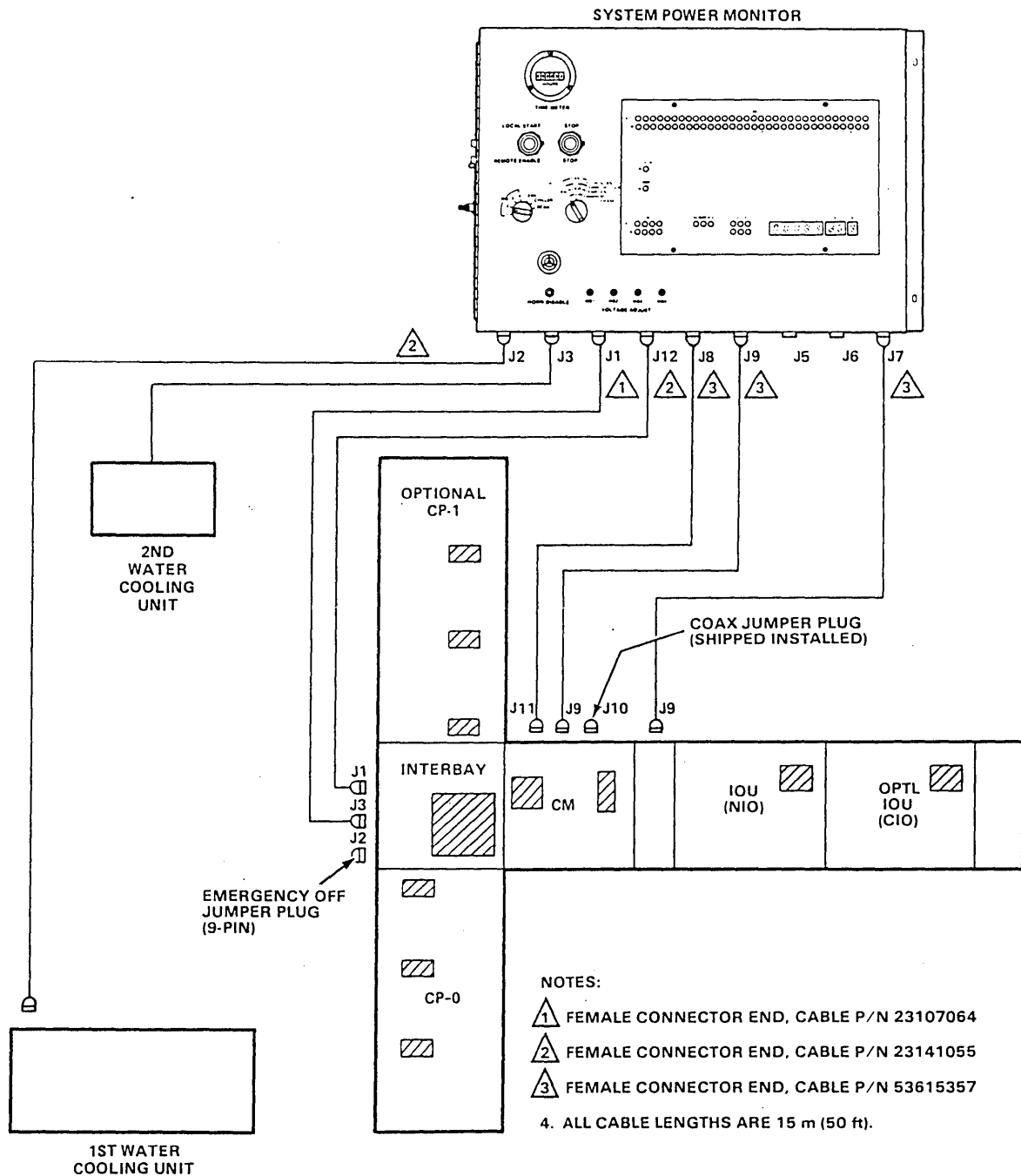
- Emergency-off jumper plug, PN 53582695. This plug is shipped with the SPM and is used on the SPM J12 during preinstallation. It is then removed from J12 and stored inside the SPM until its use in this procedure.

General Procedure:

- ___ 1. Refer to figure 4-12 for SPM cable connections to central computer and water cooling unit.
- ___ 2. Use following procedure when further details are necessary for performing cable connections.

CONNECTING CP CABLES (Sheet 23 of 27)

CONNECT SYSTEM POWER MONITOR CABLES (Cont'd)



01317-4

Figure 4-12. SPM Cable Connections to Central Computer

CONNECTING CP CABLES (Sheet 24 of 27)

CONNECT SYSTEM POWER MONITOR CABLES (Cont'd)

Procedure:

- ___ 1. Remove side plate from bulkhead stand inside interbay (figure 4-13).
- ___ 2. Remove emergency-off jumper plug from inside SPM, and connect it to bulkhead stand connector J2.
- ___ 3. Remove floor tiles as necessary to locate under-floor cables from SPM.
- ___ 4. Locate cable from SPM J12. Connect it to bulkhead stand connector J1.
- ___ 5. Locate cable from SPM J1. Connect it to bulkhead stand connector J3.
- ___ 6. Replace side plate on bulkhead stand.
- ___ 7. Remove terminator from CM connector panel location J9.
- ___ 8. Store removed terminator inside SPM.
- ___ 9. Locate cable from SPM J9. Connect it to CM J9.
- ___ 10. Locate cable from SPM J8. Connect it to CM J11.

CONNECTING CP CABLES (Sheet 25 of 27)

CONNECT SYSTEM POWER MONITOR CABLES (Cont'd)

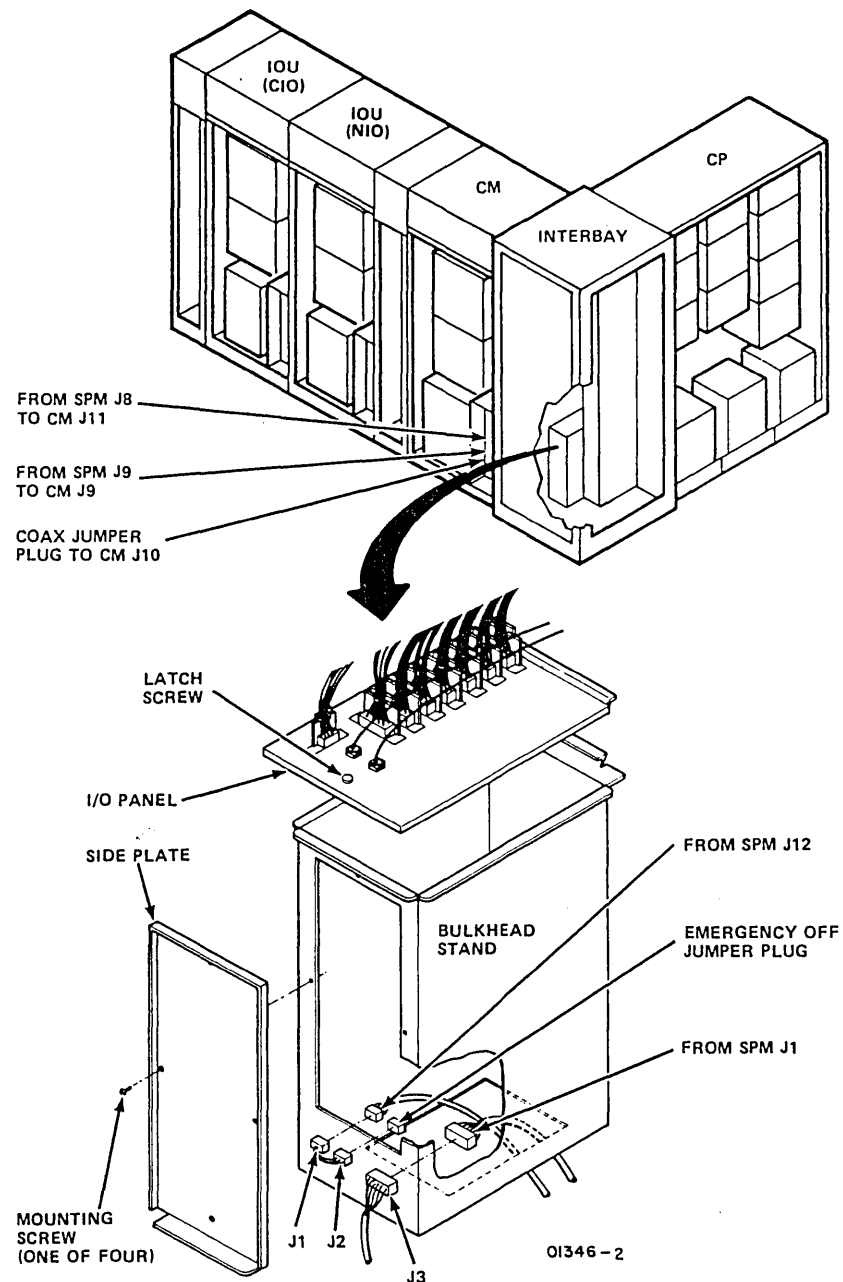


Figure 4-13. SPM Cable Connections to Interbay and CM

CONNECTING CP CABLES (Sheet 26 of 27)

CONNECT SYSTEM POWER MONITOR CABLES (Cont'd)

- ___ 11. Remove cover from interface assembly. This applies to 102 L/min (27 gal/min) water cooling unit only (figure 4-14).
- ___ 12. Locate cable under raised floor from SPM J2. Remove floor tiles as necessary to locate cable.
- ___ 13. Pull cable up through cable cutouts in floor and in bottom of water cooling unit.
- ___ 14. Remove cover from power interface box.
- ___ 15. Connect cable from SPM J2 to J1 the bottom of the interface box in water cooling unit (figure 4-14).
- ___ 16. Install cover on interface assembly of 102 L/min (27 gal/min) water cooling unit.
- ___ 17. Install cover plate on power distribution box, if cover is off.

IS OPTIONAL 102 L/min (27 gal/min) WATER COOLING UNIT PART OF INSTALLATION?

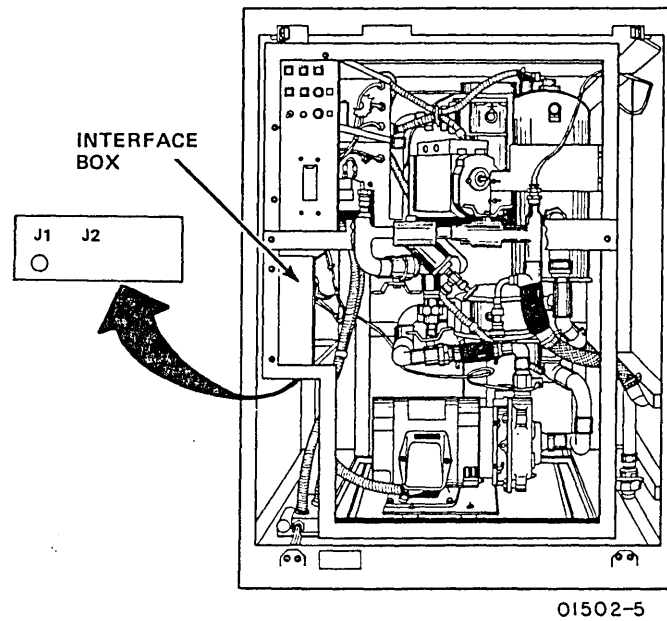
- If yes, repeat steps 11 through 16, except connect cable from SPM J3 to optional water cooling unit J1.
- If no, go to step 17.

- ___ 18. Install floor tiles.
- ___ 19. Record time on flowchart for connecting CP cables.

CONNECTING CP CABLES (Sheet 27 of 27)

CONNECT SYSTEM POWER MONITOR CABLES (Cont'd)

102 L/MIN (27 GAL/MIN) WATER COOLING UNIT



220 L/MIN (58 GAL/MIN) WATER COOLING UNIT

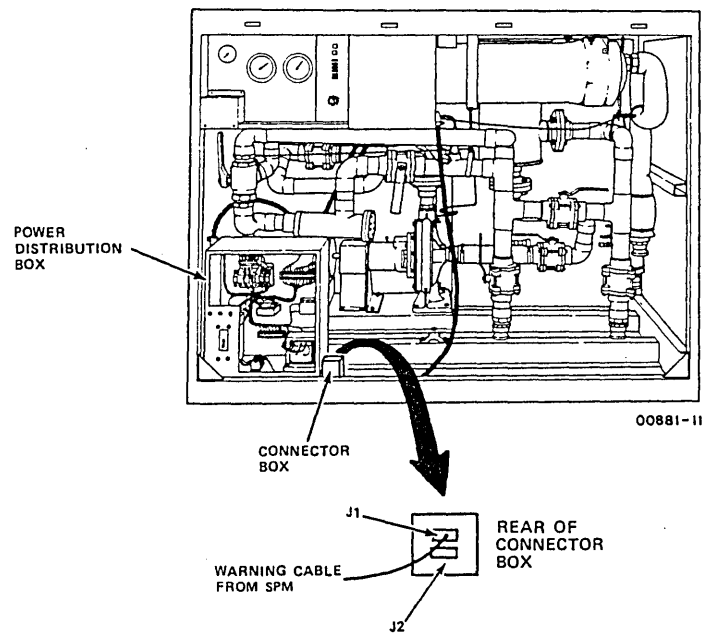


Figure 4-14. SPM Cable Connections to Water Cooling Unit

CHECKING CABINET INITIAL CONDITIONS (Sheet 1 of 13)

The following cabinet wiring checks ensure the correct wiring connections for transformers and blower motors for the available site voltage.

- Verify or change blower motor connections in CM and IOU cabinets.
- Verify or change motor and ALT2 transformer connections in 102 L/min (27 gal/min) water cooling unit.
- Verify or change motor and transformer connections in 220 L/min (58 gal/min) water cooling unit.
- Verify or change cabinet switches.

CHECKING CABINET INITIAL CONDITIONS (Sheet 2 of 13)

VERIFY OR CHANGE BLOWER MOTOR CONNECTIONS IN CM AND IOU CABINETS

Use this procedure to ensure that the cabinet blower motor wiring in the CM, IOU NIO, and optional IOU CIO cabinets corresponds to the available site voltage.

Procedure prerequisites:

- 50/60-Hz power to CM and IOU cabinets is off.
- 400-Hz power to CM and IOU cabinets is off.

Procedure:

- ___ 1. Identify site voltage as 60-Hz, 3-phase, 120/208-V; 50-Hz, 3-phase, 220/380-V; or 50-Hz, 3-phase, 240/415-V.
- ___ 2. Verify that label on outside of 50/60-Hz power distribution box (figure 4-15) in CM cabinet indicates that cabinet is wired for available site voltage.

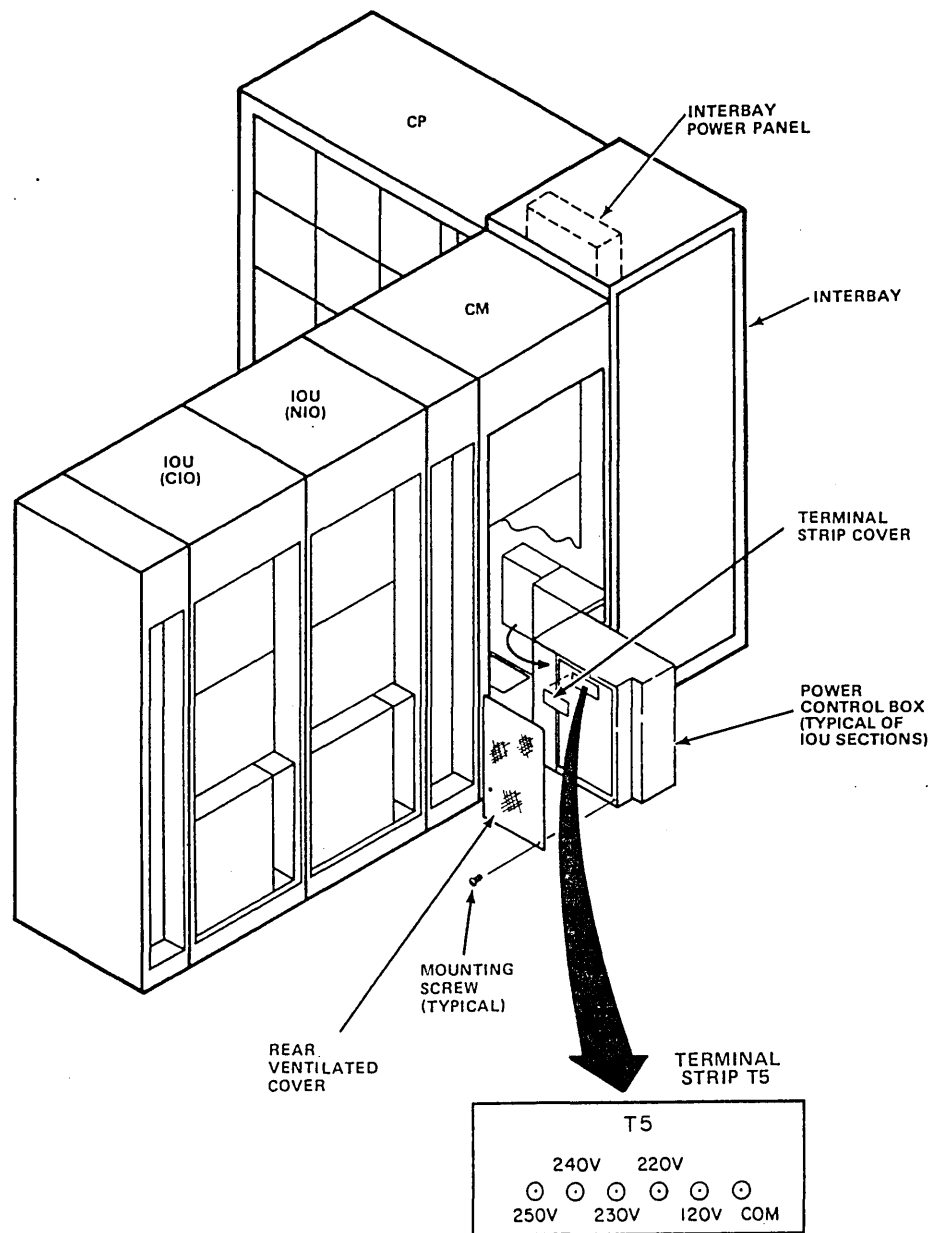
IS CABINET WIRED FOR SITE VOLTAGE?

- If yes, go to steps 13 and 14.
- If no, go to step 3.

- ___ 3. Verify power-off conditions as follows:
 - ___ a. Verify that all circuit breakers on interbay power panel are set to OFF.
 - ___ b. Verify that MAIN DISCONNECT circuit breaker on CM power distribution box is set to OFF.
- ___ 4. Remove retaining screw and lockwasher from front lower left corner of hinged power distribution box.
- ___ 5. Swing power distribution box outward from cabinet.
- ___ 6. Remove rear ventilated cover from power distribution box.
- ___ 7. Remove terminal strip cover from transformer T5, located at rear top center of power distribution box.
- ___ 8. Observe that one wire connects to COM terminal, second wire to 120-V terminal, and a third wire (labeled RECONNECTABLE) connects to a terminal that corresponds to site voltage. If second wire is already connected to terminal that matches site voltage, proceed to step 9.
- ___ 9. Reconnect third wire (labeled RECONNECTABLE), if necessary, to a terminal that corresponds to site voltage.
- ___ 10. Install terminal strip cover on T5.

CHECKING CABINET INITIAL CONDITIONS (Sheet 3 of 13)

VERIFY OR CHANGE BLOWER MOTOR CONNECTIONS IN CM AND IOU CABINETS (Cont'd)



01330-1

Figure 4-15. Blower Motor Wiring Connections in CM

CHECKING CABINET INITIAL CONDITIONS (Sheet 4 of 13)

VERIFY OR CHANGE BLOWER MOTOR CONNECTIONS IN CM AND IOU CABINETS (Cont'd)

- ___ 11. Reinstall rear ventilated cover on power distribution box.
- ___ 12. Close power distribution box, and secure with retaining screw.
- ___ 13. Repeat this procedure for IOU NIO cabinet.
- ___ 14. Repeat this procedure for optional IOU CIO cabinet.

CHECKING CABINET INITIAL CONDITIONS (Sheet 5 of 13)

VERIFY OR CHANGE MOTOR AND TRANSFORMER CONNECTIONS IN 102-L/min (27-gal/min) UNIT

Use this procedure to ensure that the single-phase step-down transformer wiring in the 102-L/min (27-gal/min) water cooling unit corresponds to the available site voltage: 60-Hz, 3-phase, 120/208-V; 50-Hz, 3-phase, 220/380-V; or 50-Hz, 3-phase, 240/415-V.

Tools required:

- Slotted screwdriver
- Phillips screwdriver

Procedure:

DOES POWER LABEL ON BOTTOM OF WATER COOLING UNIT 50/60-Hz POWER INPUT BOX (figure 4-16) INDICATE THAT COOLING UNIT IS WIRED FOR SITE VOLTAGE?

- If yes, go to step 5.
- If no, go to step 1.

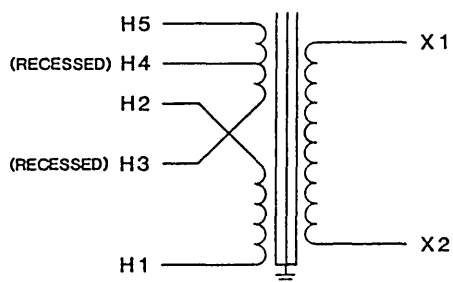
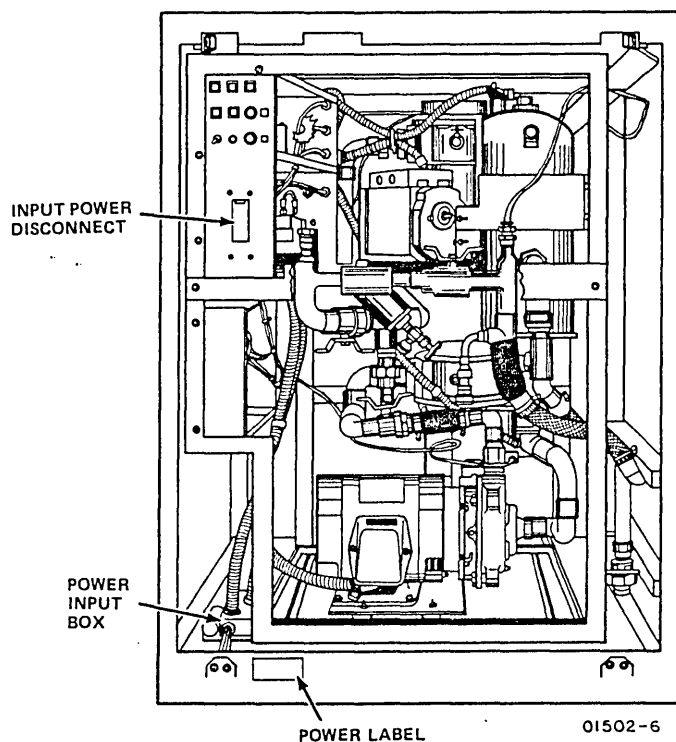
___ 1. Verify power-off conditions as follows:

- ___ a. Verify that wall-mounted circuit breaker that controls 50/60-Hz power to water cooling unit is set to OFF.
- ___ b. Verify that INPUT POWER DISCONNECT switch on water cooling unit is set to OFF.

- ___ 2. Remove cover from interface box to expose transformer.
- ___ 3. Ensure that the input power to A5TB1 is zero volts to ground on each terminal.
- ___ 4. Connect transformer ALT2 for the correct site voltage using figure 4-16.

CHECKING CABINET INITIAL CONDITIONS (Sheet 6 of 13)

VERIFY OR CHANGE MOTOR AND TRANSFORMER CONNECTIONS IN 102-L/min (27-gal/min) UNIT (Cont'd)



VOLTS	50/60-HZ LINE	JUMPER
416	H1 AND H5	H2 TO H3
380	H1 AND H4	H2 TO H3
208	H1 AND H5	H1 TO H3 H2 TO H5
115	X1 AND X2	

Figure 4-16. Transformer Connections in 102-L/min (27-gal/min) Unit

CHECKING CABINET INITIAL CONDITIONS (Sheet 7 of 13)

VERIFY OR CHANGE MOTOR AND TRANSFORMER CONNECTIONS IN 102-L/min (27-gal/min) UNIT (Cont'd)

- ___ 5. Remove cover from motor exposing wires in wire box.

NOTE

There are nine leads in the motor wire box.

- ___ 6. Ensure motor is wired for correct site voltage. Refer to the following text for the correct wiring.

<u>Low Voltage Line</u> (60-Hz, 208-Volts)		<u>High Voltage Line</u> (50-Hz, 398/415-Volts)	
Ø3-----3-----9	6	Ø3-----3	9-----6
Ø2-----2-----8	5	Ø2-----2	8-----5
Ø1-----1-----7	4	Ø1-----1	1-----4

CHECKING CABINET INITIAL CONDITIONS (Sheet 8 of 13)

VERIFY OR CHANGE MOTOR AND TRANSFORMER CONNECTIONS IN 220-L/min (58-gal/min) UNIT

Use this procedure to verify and change, if necessary, the pump motor wiring and control transformer wiring connections in the 220-L/min (58-gal/min) water cooling unit so that they correspond to available site voltage.

Procedure prerequisite:

- 50/60-Hz power to water cooling unit is off.

Tools required:

- Phillips screwdriver
- Slotted screwdriver
- Digital multimeter, John Fluke Model 8020A or equivalent

Procedure:

DOES POWER LABEL ON TOP OF WATER COOLING UNIT POWER DISTRIBUTION BOX INDICATE THAT COOLING UNIT IS WIRED FOR SITE VOLTAGE?

- If yes, go to next procedure.
- If no, go to step 1.

___ 1. Use screwdriver to remove cover from motor wiring junction box on side of motor (figure 4-17).

___ 2. If necessary, change motor wiring connections to match site voltage.

___ a. For motor operation on 3-phase, 50/60-Hz power at 208 V:

<u>Wire No.</u>		<u>Wire No.</u>
1	to	7
2	to	8
3	to	9
4	to	5 and 6

___ b. For motor operation on 3-phase, 50/60-Hz power at 240 V:

<u>Wire No.</u>		<u>Wire No.</u>
4	to	7
5	to	8
6	to	9
1 unconnected and insulated		
2 unconnected and insulated		
3 unconnected and insulated		

___ 3. Install cover on junction box.

___ 4. Remove vented cover from power distribution box.

CHECKING CABINET INITIAL CONDITIONS (Sheet 9 of 13)

VERIFY OR CHANGE MOTOR AND TRANSFORMER CONNECTIONS IN 220-L/min (58-gal/min) UNIT (Cont'd)

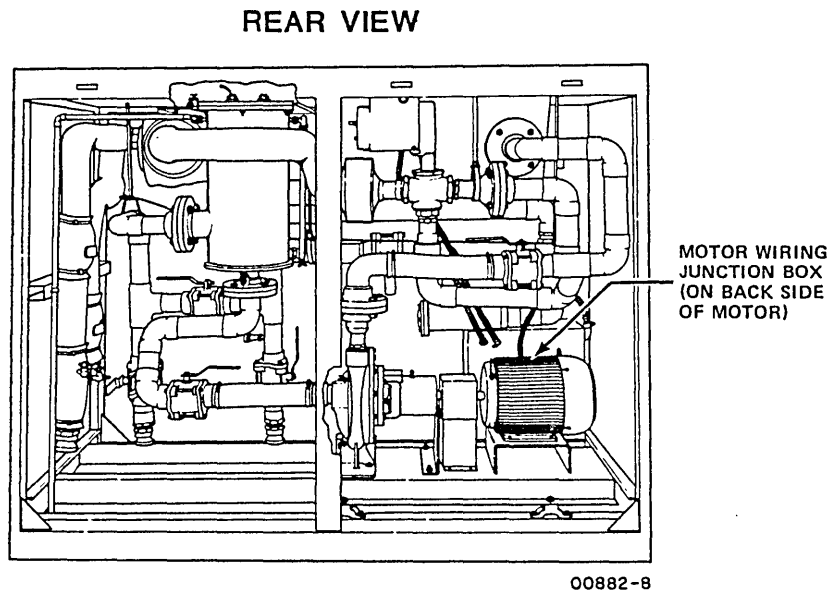
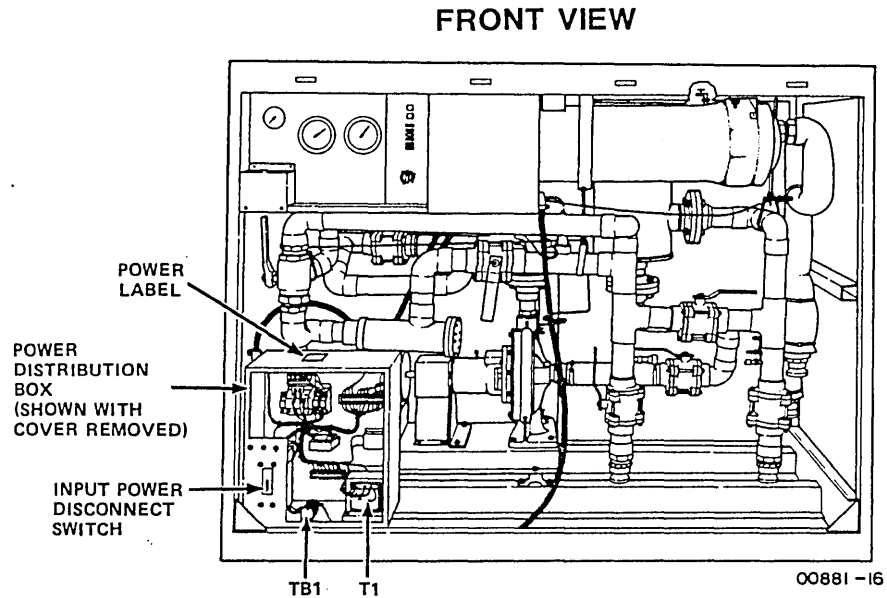


Figure 4-17. Wiring Connection Locations 220-L/min (58-gal/min) Unit

CHECKING CABINET INITIAL CONDITIONS (Sheet 10 of 13)

VERIFY OR CHANGE MOTOR AND TRANSFORMER CONNECTIONS IN 220-L/min (58-gal/min) UNIT (Cont'd)

- ___ 5. If necessary, change control transformer wiring connections to correspond to site voltage.

- ___ a. For water cooling unit operation on 3-phase, 50/60-Hz power at 416 V:

<u>208-V Line</u>		<u>Tl Terminal No.</u>		<u>Tl Terminal No.</u>
L1	to	H1	to	H3
L2	to	H5	to	H2

- ___ b. For water cooling unit operation on 3-phase, 50/60-Hz power at 416 V:

<u>208-V Line</u>		<u>Tl Terminal No.</u>		<u>Tl Terminal No.</u>
L1	to	H1		-
L2	to	H5		-
		H2	to	H3

- ___ 6. Remove applicable power label from bag at rear of power distribution box. Remove backing from label and stick label over nonapplicable label on top of power distribution box.

CHECKING CABINET INITIAL CONDITIONS (Sheet 11 of 13)

VERIFY OR CHANGE CABINET SWITCHES

Use this procedure to verify and change, if necessary, the SYSTEM EMERGENCY switch, DIP switches at the rear of the CM, CP-0, and CP-1 cabinets, fuses in the IOU cabinet, and relay time settings in the IOU cabinet.

Tool required:

- Phillips screwdriver

Procedure:

- ___ 1. Set interbay switches as follows:

NOTE

The system power monitor does not operate unless the SYSTEM EMERGENCY switch is set to ON.

- ___ a. SYSTEM EMERGENCY to ON
- ___ b. Circuit breakers CB1 through CB16 to OFF

NOTE

The DIP switches have two positions (0 and 1). Only the 0 positions are identified on the switches.

- ___ 2. Verify DIP switch settings at rear of CM cabinet (figure 4-18) by observing that the A5 slide is positioned at 1 (left) and the A6, A7, and CHILLER slides are positioned at 0 (right). If slides are incorrectly set, reset them.
- ___ 3. Verify DIP switch setting at rear of CP-0 column 1 as follows:
 - ___ a. Use Phillips screwdriver to remove multiplexer board cover. Cover has two screws.
 - ___ b. Observe that the A5, A6, A7, and CHILLER slides on multiplexer board DIP switch are positioned at 0 (right). Reset if necessary.
 - ___ c. Reinstall multiplexer board cover.

CHECKING CABINET INITIAL CONDITIONS (Sheet 12 of 13)

VERIFY OR CHANGE CABINET SWITCHES (Cont'd)

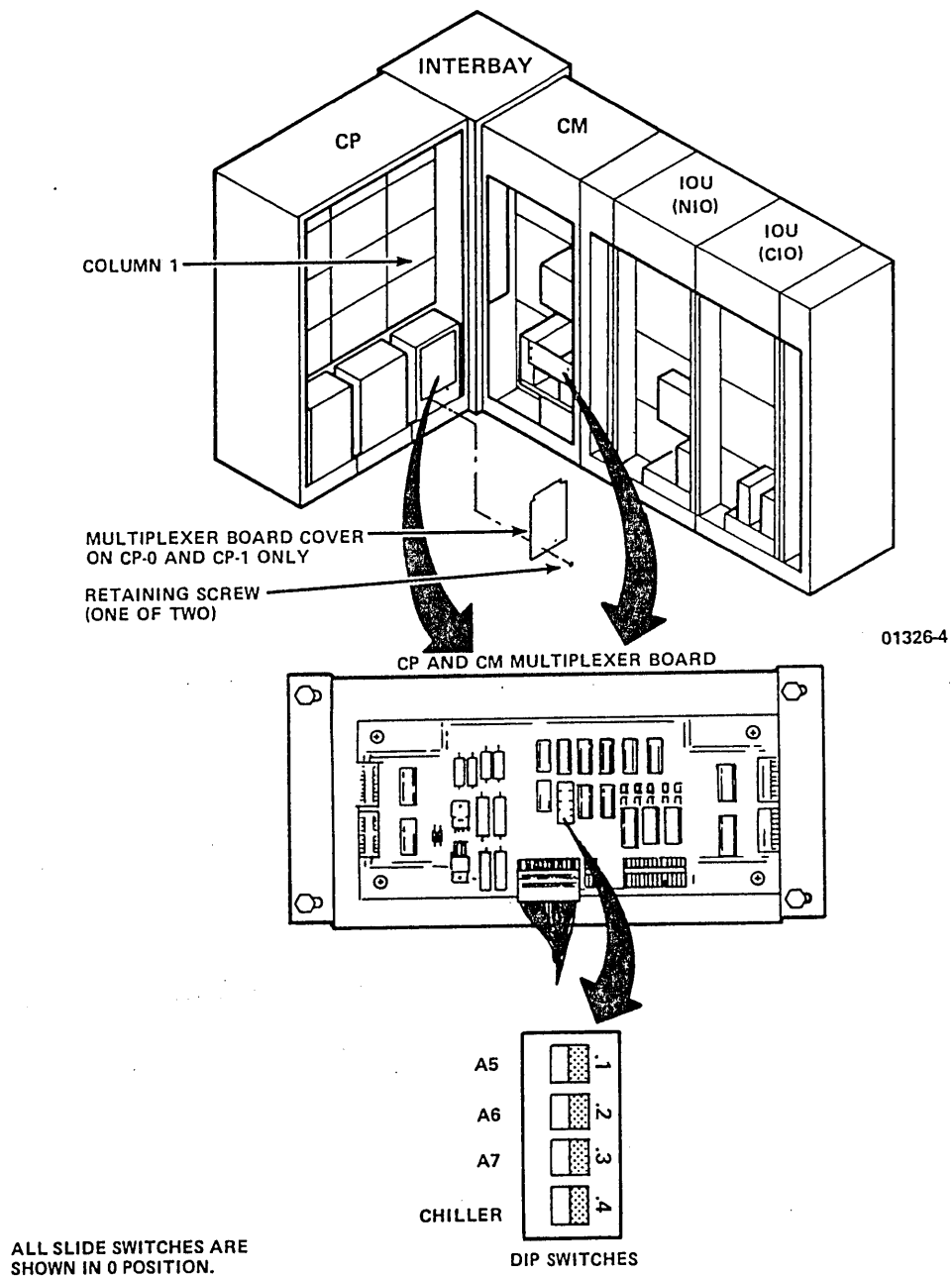


Figure 4-18. Multiplexer Board DIP Switches in CP and CM Cabinets

CHECKING CABINET INITIAL CONDITIONS (Sheet 13 of 13)

VERIFY OR CHANGE CABINET SWITCHES (Cont'd)

IS OPTIONAL CP-1 PART OF INSTALLATION?

- If yes, go to step 4.
- If no, go to step 5.

- ___ 4. Verify DIP switch settings at rear of optional CP-1 column 1 (same location as in CP-0) as follows:
- ___ a. Remove multiplexer board cover. Cover has two screws.
 - ___ b. Check to see that A6 slide is positioned at 1 (left) and A5 and A7 slides are positioned at 0 (right). Reset them if necessary.
 - ___ c. Check that CHILLER slide is positioned at 1 (left) when optional CP-1 cooling is from a second water cooling unit. When optional CP-1 cooling from the same water cooling unit as CP-0, set chiller slide to 0 right.
 - ___ d. Reinstall multiplexer board cover.
- ___ 5. Record time on flowchart for checking cabinet initial conditions.

APPLYING SYSTEM POWER (Sheet 1 of 32)

Applying system power consists of starting the M-G set and water cooling unit(s) from the system power monitor (SPM), turning on power to the central processor cabinets, and adjusting cabinet voltages as described in the following procedures:

WARNING

In case of a personnel or equipment emergency, a SYSTEM EMERGENCY switch on the front of the interbay may be used to remove system power.

NOTE

Perform the following procedures with installer 1.

- Apply M-G set power from SPM.
- Apply power and adjust voltages for IOU NIO cabinet.
- Apply power and adjust voltages for IOU optional CIO cabinet.
- Apply power and adjust voltages for CP-0 and optional CP-1.
- Apply power and adjust voltages for CM.

APPLYING SYSTEM POWER (Sheet 2 of 32)

APPLY M-G SET POWER FROM SPM

Use this procedure to start the M-G set power from the controls on the system power monitor (SPM).

Procedure prerequisites:

- M-G set power was previously checked out and run in the local mode of operation. M-G set is set for remote operation.
- M-G set output voltages were previously adjusted.
- All wall-mounted disconnect boxes that control power from the M-G set to the computer system are set to OFF.
- Switch groups SN1, SN2, and SN3 in the SPM were set to system conditions during preinstallation.

Procedure:

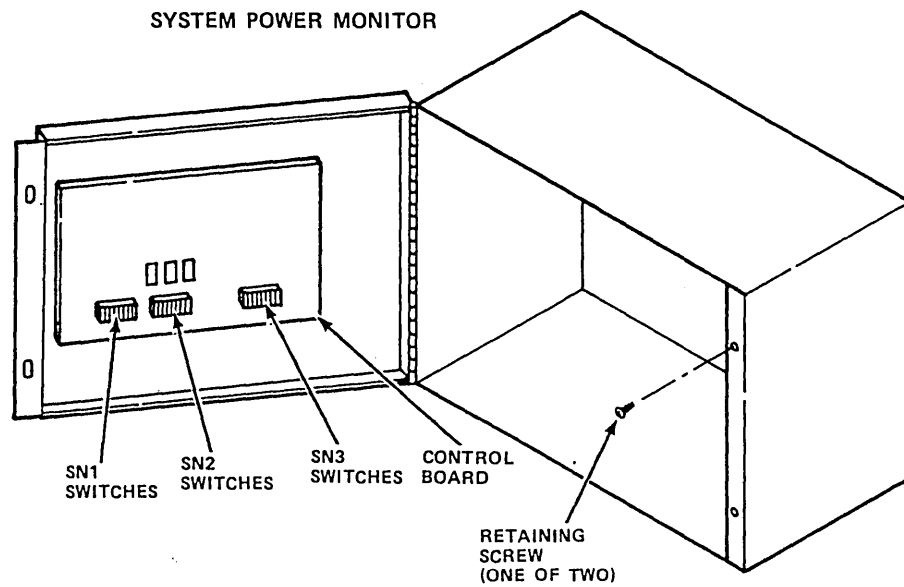
- ___ 1. Set all circuit breakers on interbay power panel to OFF. This may already have been done.
- ___ 2. Remove two retaining screws and open SPM door (figure 4-19).
- ___ 3. Verify all SPM switch settings are correct. Refer to Checking SPM Preoperating Conditions in section 2 of this manual.
- ___ 4. Close SPM door and install retaining screws.
- ___ 5. Set wall-mounted circuit breaker that controls 50/60-Hz power to SPM to ON. This circuit breaker may not be present at all sites.
- ___ 6. Set keyswitch on side of SPM (figure 4-20) to LOCAL.
- ___ 7. Set SYSTEM EMERGENCY switch on interbay to ON.
- ___ 8. Set SYSTEM DISCONNECT switch on left side of SPM to ON. This applies 50/60-Hz power to SPM.

NOTE

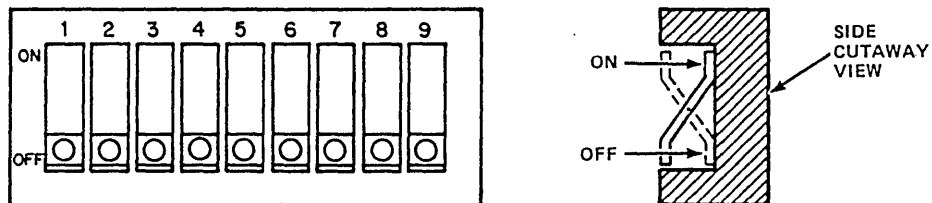
Emergency-off jumper plug must be connected (done in a previous procedure) to interbay bulkhead stand connector J2 to start MG from SPM.

APPLYING SYSTEM POWER (Sheet 3 of 32)

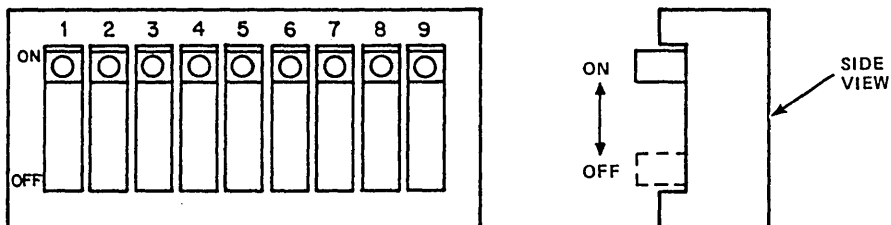
APPLY M-G SET POWER FROM SPM (Cont'd)



SN1, SN2, AND SN3 DETENT SWITCHES



SN1, SN2, AND SN3 SLIDE SWITCHES



NOTES:

1. FRONT VIEWS SHOW SWITCHES SET TO ON. SWITCH POSITIONS VARY, DEPENDING ON SITE CONFIGURATIONS AND OPTIONS.
2. SN1 AND SN2 HAVE ONLY EIGHT SWITCHES. SN3 HAS NINE.
3. SN1, SN2, AND SN3 MAY BE DETENT, SLIDE, OR OTHER SWITCHES.

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Figure 4-19. SPM Switches SN1, SN2, and SN3

APPLYING SYSTEM POWER (Sheet 4 of 32)

APPLY M-G SET POWER FROM SPM (Cont'd)

- ___ 9. Press and release LOCAL START switch on front of SPM. Switch SN2-8 in SPM must be set to OFF (per preinstallation instructions); if not, COLUMN FAULT indicator lights at this time.

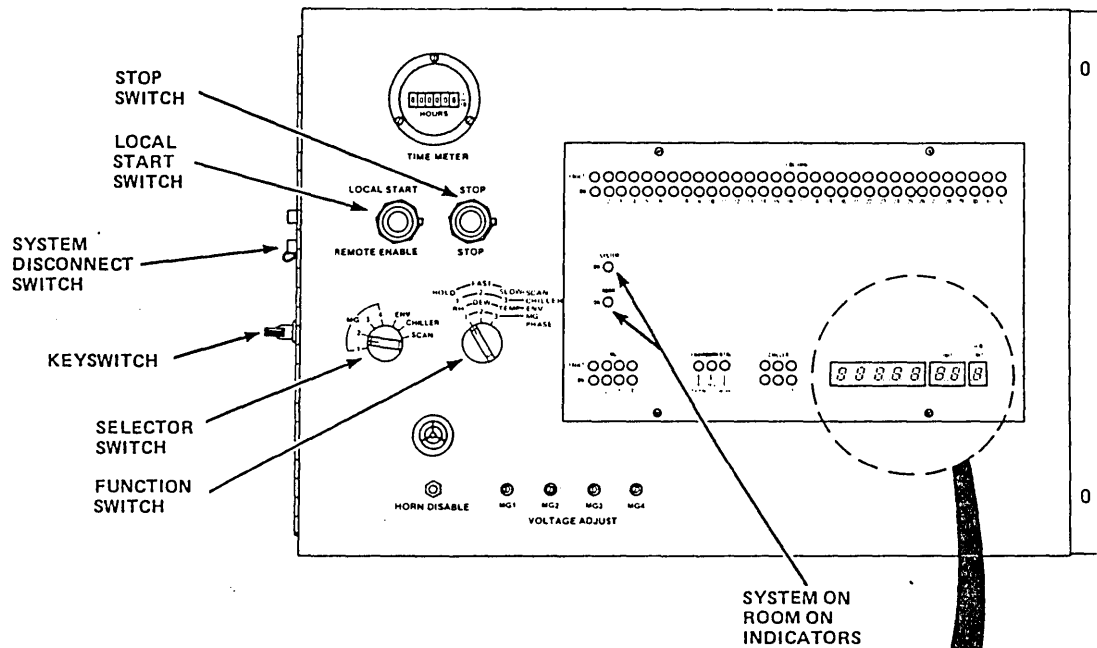
NOTE

Allow 1 min for MG to reach full output voltage.

- ___ 10. Verify that SYSTEM ON and ROOM ON indicators on SPM are lit and SPM cooling fan is running.
- ___ 11. Set selector switch to select system MG being used: selection 1, 2, 3, or 4.
- ___ 12. Set function switch on front of SPM to MG PHASE 1. Verify that MG phase 1 voltage display is between 118 V and 120 V.
- ___ 13. Set function switch to MG PHASE 2. Verify that MG PHASE 2 voltage display is between 118 V and 120 V.
- ___ 14. Set function switch to MG PHASE 3. Verify that MG PHASE 3 voltage display is between 118 V and 120 V.
- ___ 15. Adjust VOLTAGE ADJUST setscrew on front of SPM, if necessary, to obtain correct MG phase voltages.
- ___ 16. Verify that electrician has checked for the presence of correct 50/60-Hz single-phase and 400-Hz three-phase power at input to power distribution box in interbay power panel. Power checks must be made as described in section 5 of this manual.
- ___ 17. Repeat steps 10 through 14 for other M-G sets in system, if applicable.
- ___ 18. Set LOCAL/REMOTE switch on each 102 L/min (27-gal/min) water cooling unit to REMOTE, or set MANUAL/AUTO switch on 220-L/min (58-gal/min) water cooling unit to MANUAL. This allows SPM to control starting and stopping of water cooling units.
- ___ 19. Press STOP switch on front of SPM, and verify powerdown of M-G set and water cooling units.
- ___ 20. Wait 5 min for MG to power down. Press LOCAL START switch on front of SPM to restart M-G set and water cooling units. Allow M-G power to remain on for following checks.

APPLYING SYSTEM POWER (Sheet 5 of 32)

APPLY M-G SET POWER FROM SPM (Cont'd)



DISPLAY DETAIL

DATA	UNIT	SUB UNIT
0.0.0.0	0.0	0
68.7	F	TEMP (ROOM)
34.3	%	HUMIDITY (ROOM)
47.2	°F	DEWPOINT (ROOM) ¹
112.9	VOLTS	MG
4.6	DC	COLUMN BEING SCANNED
62.4	°F	CHILLER
		PHASE BEING METERED
		POWER SUPPLY BEING METERED

NOTE:

¹ IF EPROM 22109583 IS INSTALLED THEN THE DEWPOINT ACTUALLY DISPLAYS TEMPERATURE.

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Figure 4-20. SPM Controls and Display Panel

APPLYING SYSTEM POWER (Sheet 6 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU NIO CABINET

Use this procedure for the first application of power to the IOU nonconcurrent input/output (NIO) cabinet and for the adjustment of the NIO IOU logic voltages. The next procedure covers the application and adjustment of power to the concurrent input/output (CIO) cabinet.

NOTE

This procedure includes turning on the clock (master oscillator) power.

Procedure prerequisites:

- Water cooling unit for IOU is operating.
- All previous checkout procedures are completed.

Equipment required:

- Digital multimeter, John Fluke model 8020A or equivalent.

Procedure:

- ___ 1. Set following circuit breakers and voltage adjust knobs on both NIO and CIO cabinets power distribution boxes (figure 4-21) as follows:
 - ___ a. MAIN DISCONNECT to OFF
 - ___ b. -2.2 V DISCONNECT to OFF
 - ___ c. -5.2 V DISCONNECT to OFF
 - ___ d. -2.2 V ADJUST knob fully counterclockwise
 - ___ e. -5.2 V ADJUST knob fully counterclockwise
 - ___ f. +5.5 V DISCONNECT TO OFF (This only applies to the CIO cabinet of IOU.)
 - ___ g. +5.5 V ADJUST knob fully counterclockwise (This only applies to the CIO cabinet of IOU.)
 - ___ h. Set mode switch on top right corner of both NIO and CIO power distribution boxes to LOCAL.
- ___ 2. Set CB3 switch on auxiliary power supply at rear of NIO cabinet to off, down position.
- ___ 3. Set wall-mounted circuit breakers that control 50/60-Hz and 400-Hz power to interbay power panel to ON.

APPLYING SYSTEM POWER (Sheet 7 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU NIO CABINET (Cont'd)

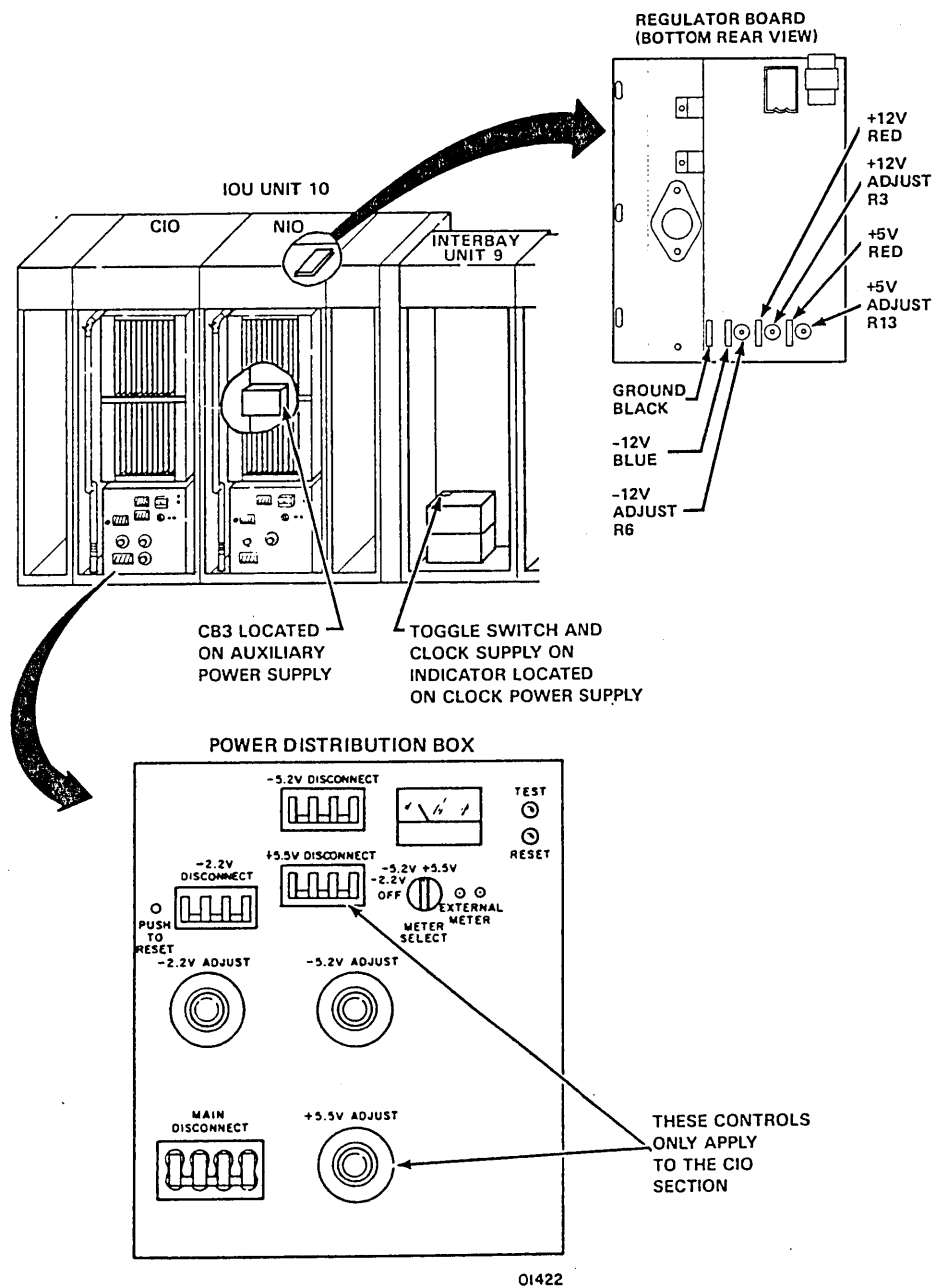


Figure 4-21. IOU Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 8 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU NIO CABINET (Cont'd)

- ___ 4. Set 50/60-Hz MAIN DISCONNECT and 400-Hz MAIN DISCONNECT circuit breakers on interbay power panel to ON.
- ___ 5. Set IOU-1 50/60-Hz circuit breaker and IOU-1 400-Hz circuit breaker on interbay power panel to ON.
- ___ 6. Set CB3 on auxiliary power supply (at rear of NIO cabinet) to on, up position.
- ___ 7. Apply NIO cabinet power by sequentially setting section circuit breakers (figure 4-22) as follows:
 - ___ a. -2.2 V DISCONNECT to ON
 - ___ b. -5.2 V DISCONNECT to ON
 - ___ c. MAIN DISCONNECT to ON
 - ___ d. Press and release RESET switch at front and upper-right corner of power distribution box.
- ___ 8. Listen for noise of circulating air to check for operation of section blower.
- ___ 9. Zero percentage meter on power distribution box as follows:
 - ___ a. Set METER SELECT switch to OFF.
 - ___ b. Turn screw on front of percentage meter, if necessary, to align meter indicator at mechanical zero mark at far left of scale.
- ___ 10. Set multimeter to measure -5.2 Vdc.
- ___ 11. Connect multimeter test leads to red (+) and blue (-) EXTERNAL METER test points on power distribution box.
- ___ 12. Adjust -5.2 V as follows:
 - ___ a. Set METER SELECT switch to -5.2 V.
 - ___ b. Turn -5.2 V ADJUST knob slowly on front of power distribution box until multimeter indicates a nominal -5.20 V.

CAUTION

Exposed terminals within the power distribution box contain 110 Vac.

APPLYING SYSTEM POWER (Sheet 9 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU NIO CABINET (Cont'd)

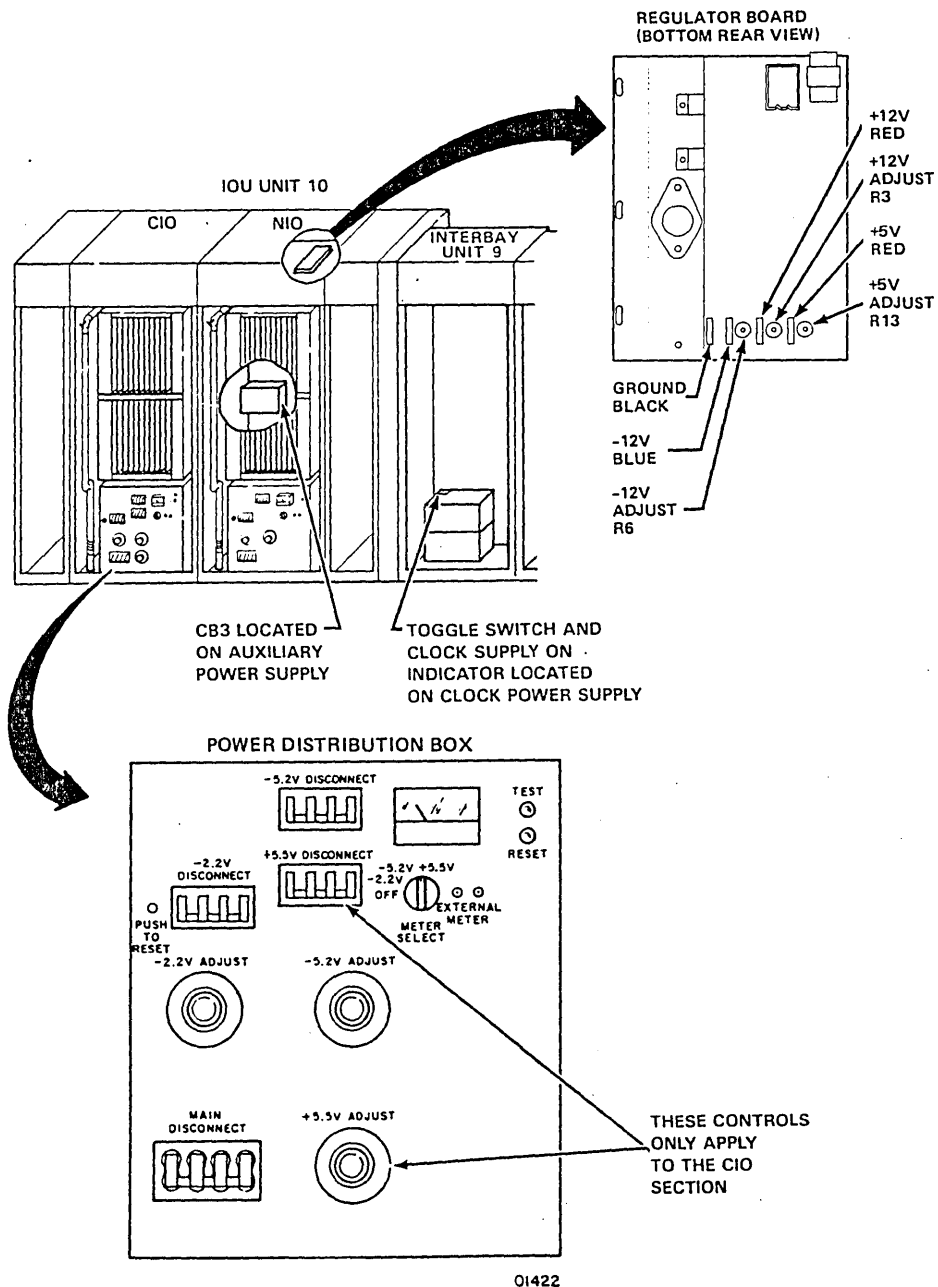


Figure 4-22. IOU Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 10 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU NIO CABINET (Cont'd)

- ___ c. Adjust R5 at rear of percentage meter, if necessary, to obtain a percentage meter indication of 0. If R4 did not require adjustment, access R5 by swinging power distribution box outward from cabinet and removing top plate. Do not reinstall top plate after adjustment.
- ___ 13. Adjust -2.2 V as follows:
 - ___ a. Set meter SELECT SWITCH to -2.2 V.
 - ___ b. Turn -2.2 V ADJUST knob slowly on front of power distribution box until multimeter indicates a nominal -2.20 V.
 - ___ c. Adjust R4 at rear of percentage meter, if necessary, to obtain a percentage meter indication of 0. Access R4 by swinging power distribution box outward from cabinet and removing top plate.
 - ___ d. Disconnect multimeter from EXTERNAL METER test points.
 - ___ e. Install top plate, if removed earlier, on power distribution box.
- ___ 14. Adjust auxiliary power supply +5 V as follows:
 - ___ a. Connect multimeter to ground and red +5 V test points on auxiliary power supply regulator board near top and rear of NIO section (figure 4-23).
 - ___ b. Turn regulator board potentiometer R13 setscrew until multimeter indicates a nominal +5.00 V.
- ___ 15. Adjust auxiliary power supply -12 V as follows:
 - ___ a. Set multimeter to read -12 Vdc.
 - ___ b. Reconnect multimeter to ground and blue -12 V test points on regulator board (figure 4-23).
 - ___ c. Turn potentiometer R6 setscrew until multimeter indicates a nominal -12.00 V.
- ___ 16. Adjust auxiliary power supply red +12 V as follows:
 - ___ a. Set multimeter to measure +12 V.
 - ___ b. Reconnect multimeter ground and to +12 V test points on regulator board (figure 4-24).
 - ___ c. Turn potentiometer R3 setscrew until multimeter indicates a nominal +12.00 V.
 - ___ d. Disconnect multimeter from regulator board.

APPLYING SYSTEM POWER (Sheet 11 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU NIO CABINET (Cont'd)

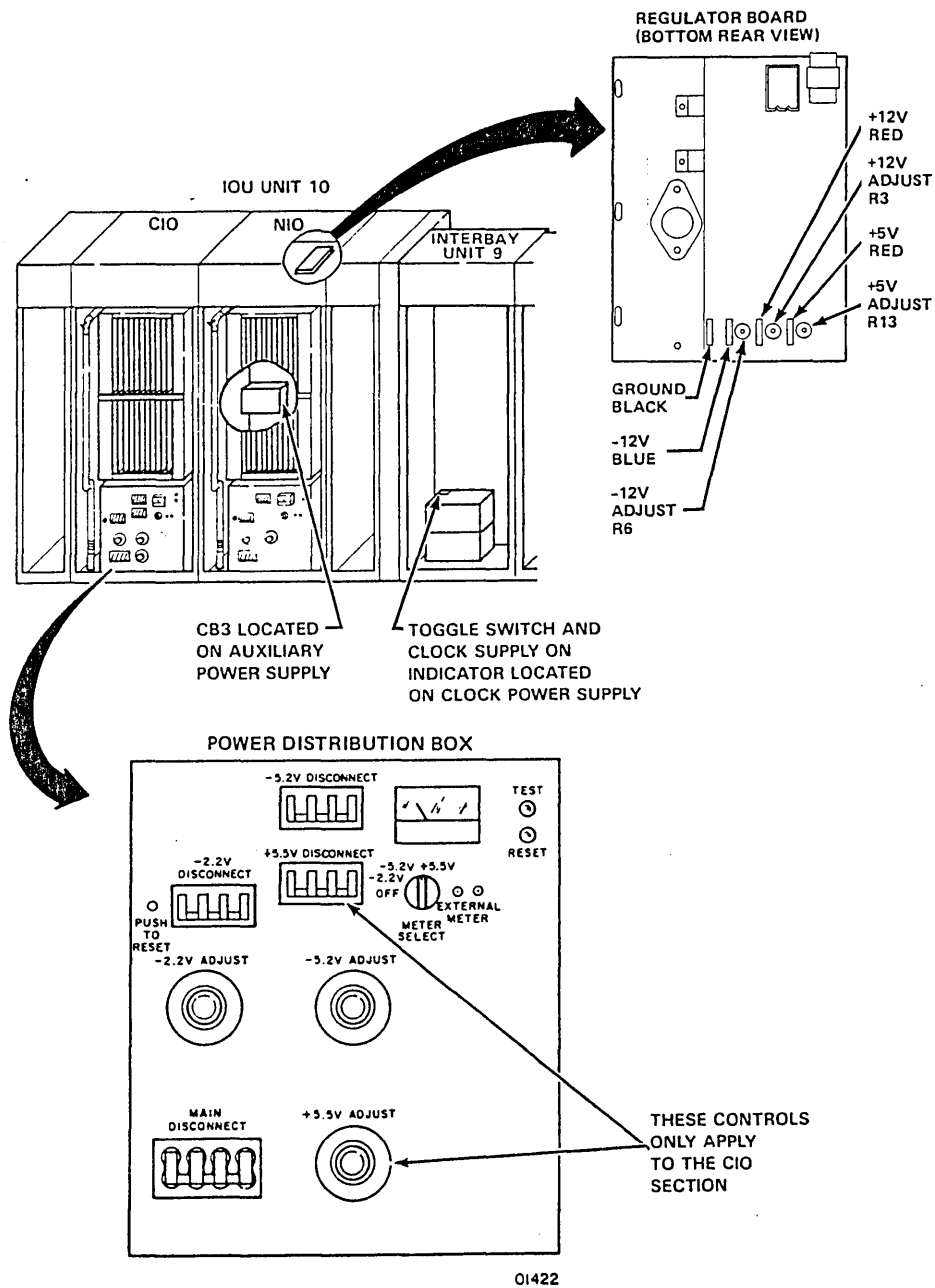


Figure 4-23. IOU Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 12 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU NIO CABINET (Cont'd)

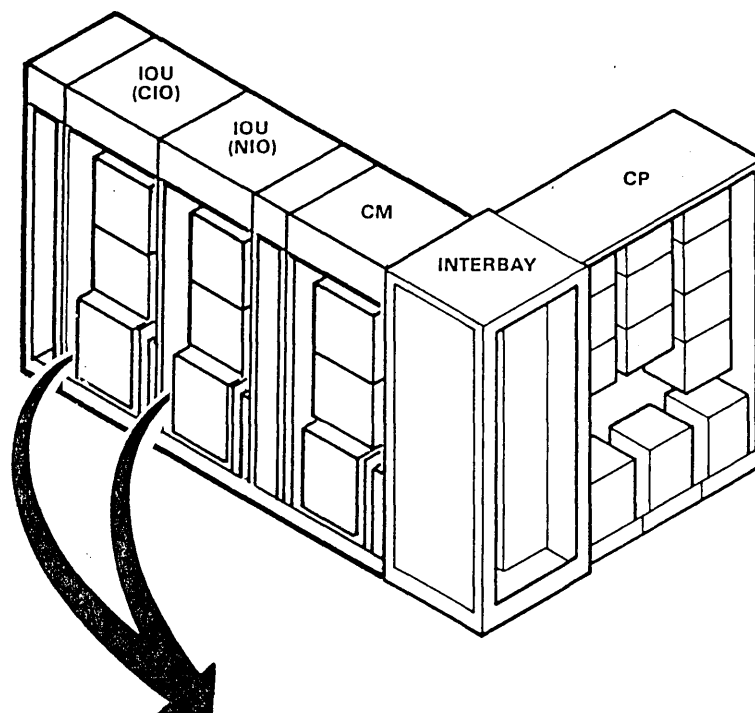
- ___ 17. Check low-temperature sensor voltage and, if necessary, adjust it as follows:
- ___ a. Set multimeter to measure 9 to 10 Vdc.

CAUTION

Place multimeter leads lightly on TBI terminals (figure 4-24) to prevent bending of the low-temperature assembly. Bending may cause an erroneous voltage reading.

- ___ b. Place meter negative (-) lead on low-temperature sensor TBI-1 and positive lead (+) on TBI-3.
- ___ c. Observe multimeter reading from 9.9 to 10.1 Vdc. If voltage is not within this range, adjust potentiometer on low-temperature assembly.
- ___ d. Remove multimeter leads from TBI.
- ___ 18. Set mode switch on top right corner of power distribution box to REMOTE.
- ___ 19. Swing power distribution box into IOU and install retaining screw.

APPLY POWER AND ADJUST VOLTAGES FOR IOU NIO CABINET (Cont'd)



LOW-TEMPERATURE SENSOR

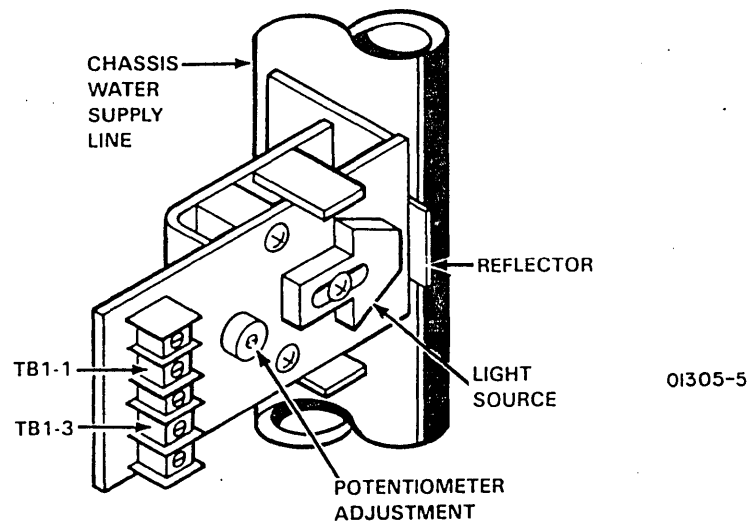


Figure 4-24. IOU Low-Temperature Sensor Assembly

APPLYING SYSTEM POWER (Sheet 14 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU CIO CABINET

Use this procedure for the first application of power to the IOU concurrent input/output (CIO) cabinet.

Procedure prerequisites:

- Water cooling unit for IOU is operating.
- The previous checkout procedure for the IOU NIO cabinet is completed.

Equipment required:

- Digital multimeter, John Fluke model 8020A or equivalent.

Procedure:

- ___ 1. Set IOU-2 50/60-Hz circuit breaker and IOU-2 400-Hz circuit breaker on interbay power panel to ON.
- ___ 2. Apply CIO cabinet power by sequentially setting section circuit breakers (figure 4-25) as follows:
 - ___ a. -2.2 V DISCONNECT to ON
 - ___ b. -5.2 V DISCONNECT to ON
 - ___ c. +5.5 V DISCONNECT to ON
 - ___ d. MAIN DISCONNECT to ON
 - ___ e. Set mode switch at top right corner of power distribution box to LOCAL.
 - ___ f. Press and release RESET switch at upper-right corner of power distribution box.
- ___ 3. Listen for noise of circulating air to check for operation of section blower.
- ___ 4. Zero percentage meter on power distribution box as follows:
 - ___ a. Set METER SELECT switch to OFF.
 - ___ b. Turn screw on front of percentage meter, if necessary, to align meter indicator at mechanical zero mark at far left of scale.
- ___ 5. Set multimeter to measure -5.2 Vdc.
- ___ 6. Connect multimeter test leads to red (+) and blue (-) to EXTERNAL METER test points on power distribution box.

APPLYING SYSTEM POWER (Sheet 15 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU CIO CABINET (Cont'd)

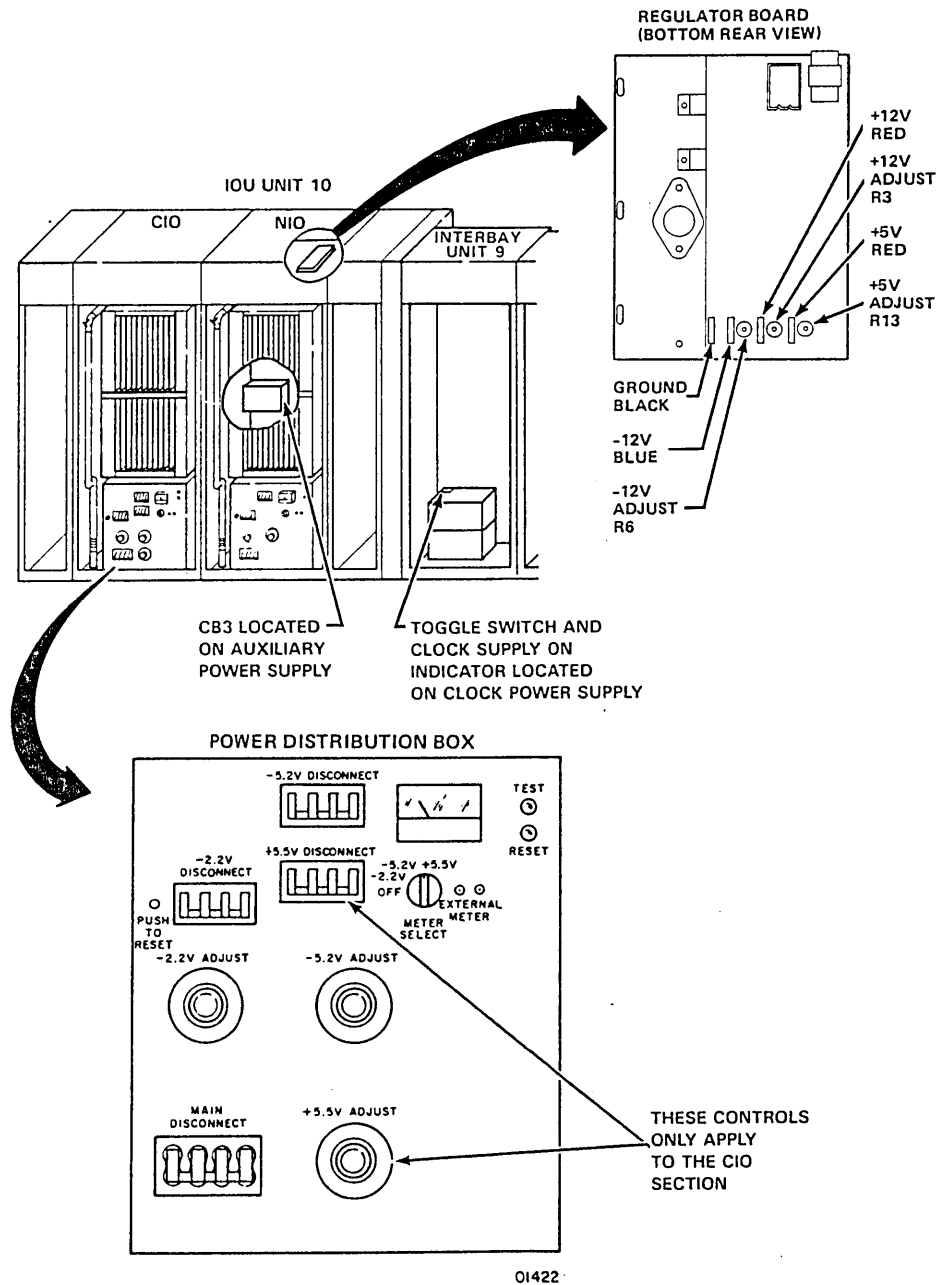


Figure 4-25. IOU Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 16 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU CIO CABINET (Cont'd)

___ 7. Adjust -5.2 V as follows:

- ___ a. Set METER SELECT switch to -5.2 V.
- ___ b. Turn -5.2 V ADJUST knob slowly on front of power distribution box until multimeter indicates a nominal -5.20 V.

CAUTION

Exposed terminals within the power distribution box contain 110 Vac.

- ___ c. Adjust R5 at rear of percentage meter, if necessary, to obtain a percentage meter indication of 0. If R4 did not require adjustment, access R5 by swinging power distribution box outward from cabinet and removing top plate. Do not reinstall top plate after adjustment.

___ 8. Adjust -2.2 V as follows:

- ___ a. Set meter SELECT SWITCH (figure 4-26) to -2.2 V.
- ___ b. Turn -2.2 V ADJUST knob slowly on front of power distribution box until multimeter indicates a nominal -2.20 V.
- ___ c. Adjust R4 at rear of percentage meter, if necessary, to obtain a percentage meter indication of 0. If R5 did not require adjustment, access R4 by swinging power distribution box outward from cabinet and removing top plate. Do not reinstall top plate after adjustment.

NOTE

Be sure to adjust the +5.5 V after adjusting the -2.2 V and -5.2 V.

APPLYING SYSTEM POWER (Sheet 17 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU CIO CABINET (Cont'd)

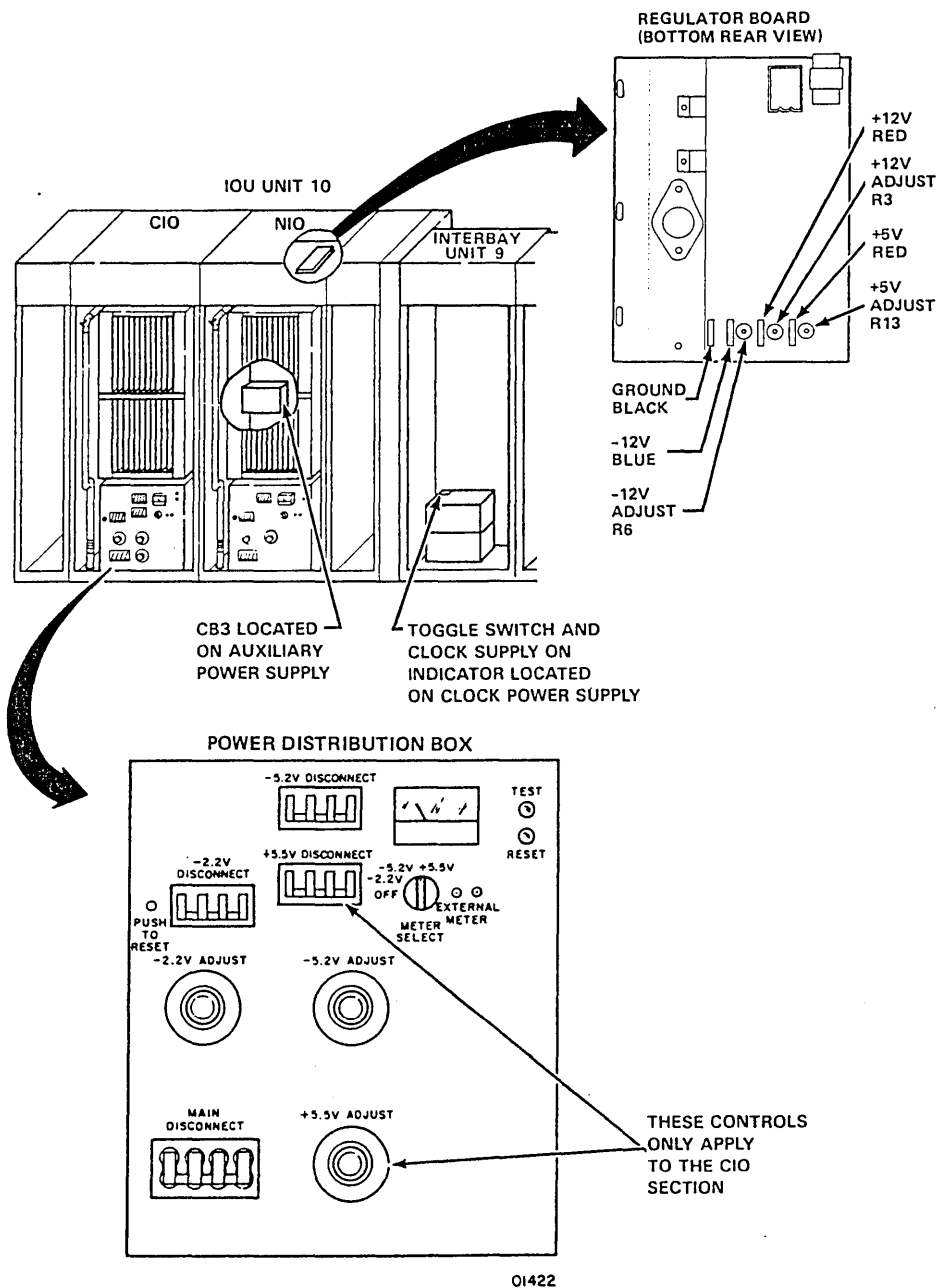


Figure 4-26. IOU Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 18 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU CIO CABINET (Cont'd)

- ___ 9. Adjust CIO power supply +5.5 V as follows:
 - ___ a. Set meter SELECT SWITCH to +5.5 V.
 - ___ b. Turn +5.5 V ADJUST knob slowly on front of power distribution box until multimeter indicates a nominal +5.00 V.
 - ___ c. Adjust R6 at rear of percentage meter, if necessary, to obtain a percentage meter indication of 0. If R4 or R5 did not require adjustment, access R6 by swinging power distribution box outward from cabinet and removing top plate.
 - ___ d. Disconnect multimeter from EXTERNAL METER test points.
 - ___ e. Install top plate, if removed earlier, on power distribution box.
- ___ 10. Check low-temperature sensor voltage and, if necessary, adjust it as follows:
 - ___ a. Set multimeter to measure 9 to 10 Vdc.

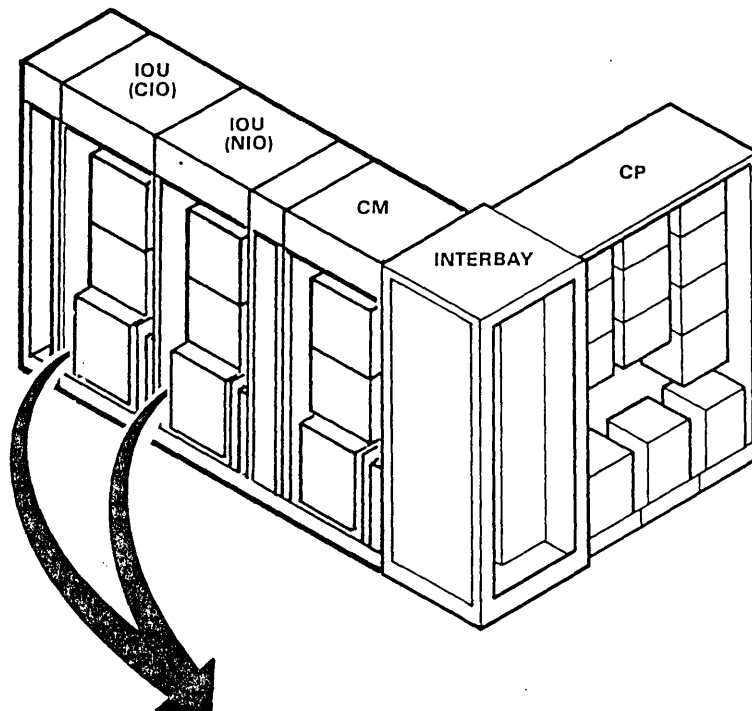
CAUTION

Place multimeter leads lightly on TB1 terminals to prevent bending of the low-temperature assembly. Bending may cause an erroneous voltage reading.

- ___ b. Place meter negative (-) lead on low-temperature sensor TB1-1 and positive lead (+) on TB1-3 (figure 4-27).
- ___ c. Observe multimeter reading from 9.9 to 10.1 Vdc. If voltage is not within this range, adjust potentiometer on low-temperature assembly.
- ___ d. Remove multimeter leads from TB1.
- ___ 11. Set mode switch on top right corner of power distribution box to REMOTE.
- ___ 12. Swing power distribution box into IOU and install retaining screw.

APPLYING SYSTEM POWER (Sheet 19 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR IOU CIO CABINET (Cont'd)



LOW-TEMPERATURE SENSOR

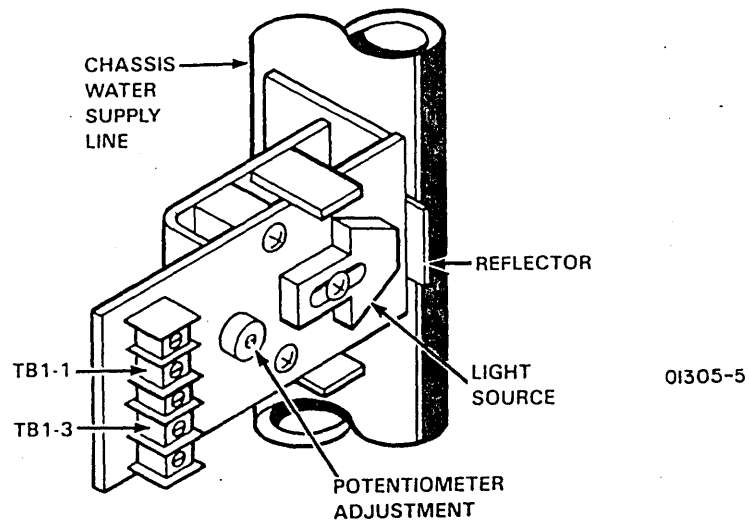


Figure 4-27. IOU Low-Temperature Sensor Assembly

APPLYING SYSTEM POWER (Sheet 20 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CP-0 AND OPTIONAL CP-1

Use this procedure for the first application of 400-Hz power to the CP cabinets and for the adjustment of CP logic voltages in both the CP-0 and optional CP-1 cabinets.

Procedure prerequisite:

- All previous installation and checkout procedures have been completed.

Equipment required:

- Digital multimeter, John Fluke Model 8020A or equivalent

Procedure:

- ___ 1. Set following circuit breakers, voltage adjust knobs, and switches at bottom of each CP column (figure 4-28) as follows:
 - ___ a. 400-Hz DISCONNECT to OFF
 - ___ b. 2.2 V DISCONNECT to OFF
 - ___ c. 4.7 V DISCONNECT to OFF
 - ___ d. 2.2 V adjust knob fully counterclockwise
 - ___ e. 4.7 V adjust knob fully counterclockwise
 - ___ f. Mode switch to LOCAL

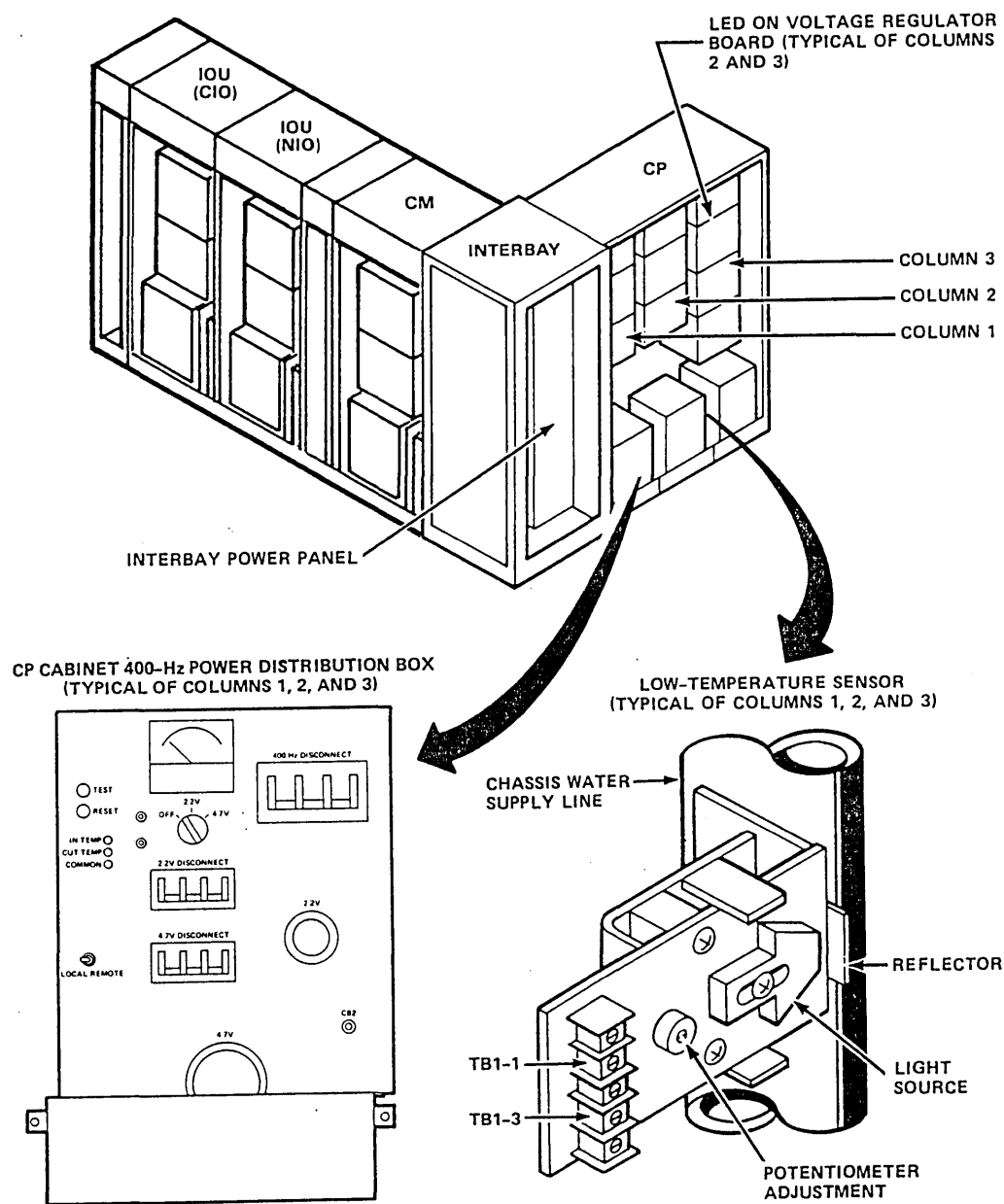
NOTE

The following steps are for CP column 1.
They must be repeated for columns 2 and 3.

- ___ 2. Set CP-0 400-Hz circuit breaker on interbay power panel to ON.

APPLYING SYSTEM POWER (Sheet 21 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CP-0 AND OPTIONAL CP-1 (Cont'd)



01305-3

Figure 4-28. CP Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 22 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CP-0 AND OPTIONAL CP-1 (Cont'd)

- ___ 3. Set 400-Hz DISCONNECT circuit breaker at CP-0 column 1 to ON.
 - ___ a. Visually check to see that POWER SUPPLY OFF indicator, located on top of 400-Hz power distribution box, is lit. All column indicators are off.
 - ___ b. Visually check to see that voltage regulator board light emitting diode (LED), located on left edge of board, is lit. This substep applies to columns 2 and 3 only.
- ___ 4. Set 2.2 V DISCONNECT and 4.7 V DISCONNECT circuit breakers to ON.
- ___ 5. Press and release RESET switch on front of power distribution box (figure 4-29).
 - ___ a. Verify that POWER SUPPLY OFF indicator is not lit.
 - ___ b. Verify that POWER ON indicator is lit.
- ___ 6. Set multimeter to a scale that measures 2 V dc to 5 V dc.
- ___ 7. Connect multimeter test leads to + (red) and - (blue) test points below percentage meter on column power supply.
- ___ 8. Mechanically zero percentage meter indicator as follows:
 - ___ a. Set meter select switch to OFF.
 - ___ b. Turn screw on front of percentage meter, if necessary, to align meter indicator at mechanical zero mark at far left of scale.
- ___ 9. Adjust power supply 4.7 V and percentage meter as follows:
 - ___ a. Set meter select switch to 4.7 V.
 - ___ b. Turn 4.7 V adjust knob on front of power distribution box slowly until multimeter indicates 4.8 V dc.
 - ___ c. Use a nonmetallic tool to adjust meter, if necessary, to 0. Do this by sliding power distribution box outward, removing top mesh cover, and adjusting 4.7 V METER ADJ screw on top of box.
- ___ 10. Adjust power supply 2.2 V and percentage meter as follows:
 - ___ a. Set meter select switch to 2.2 V.
 - ___ b. Turn 2.2 V adjust knob on front of power distribution box slowly until multimeter indicates 2.25 V dc (2.85 V dc for columns 2 and 3). If 2.2 V DISCONNECT circuit breaker trips to OFF, perform these steps:
 - ___ 1) Turn 2.2 V adjust knob a few degrees in a clockwise direction past trip point.
 - ___ 2) Reset 2.2 V DISCONNECT circuit breaker.

APPLYING SYSTEM POWER (Sheet 23 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CP-0 AND OPTIONAL CP-1 (Cont'd)

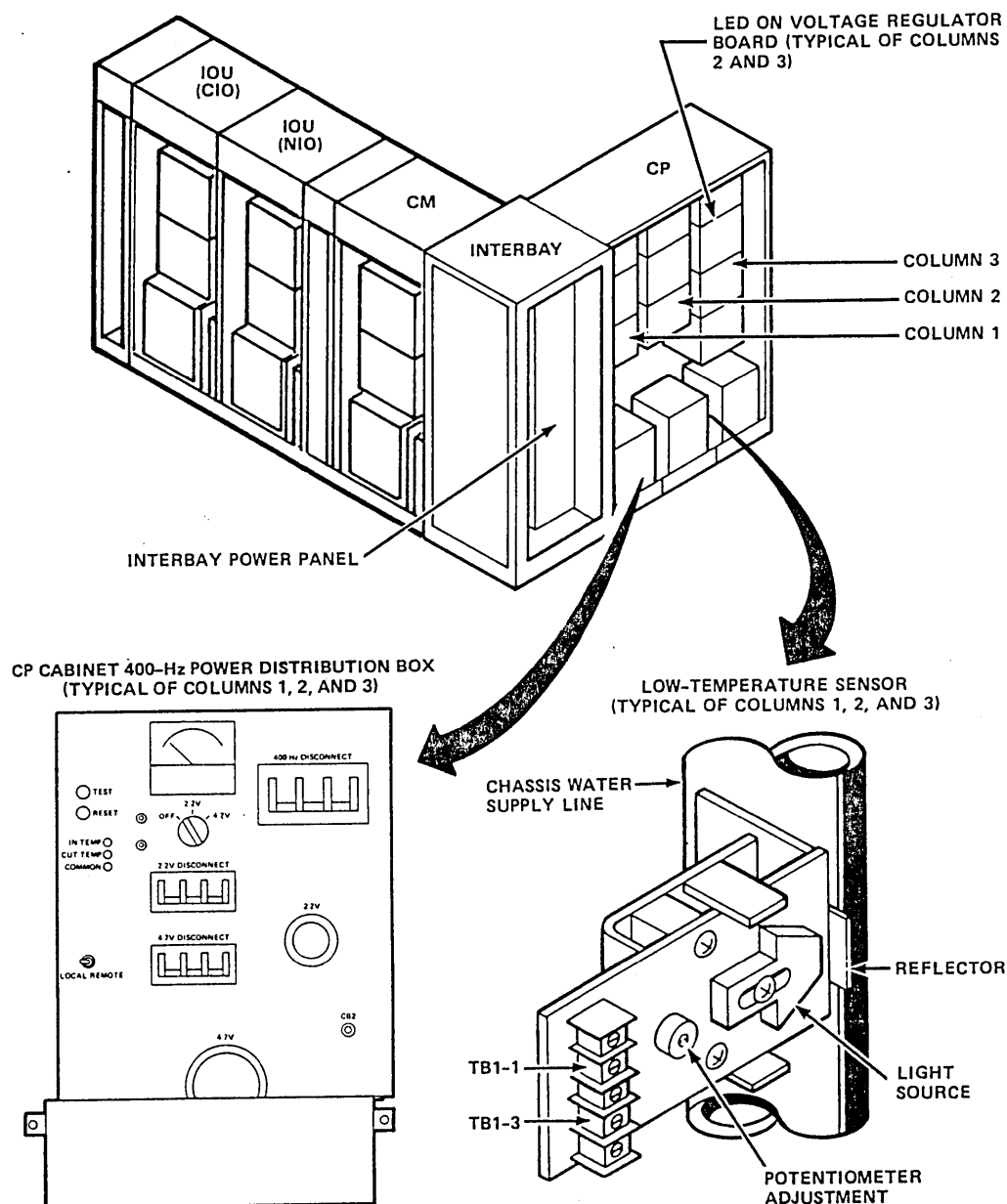


Figure 4-29. CP Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 24 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CP-0 AND OPTIONAL CP-1 (Cont'd)

- ___ 3) Push and release RESET switch on front of power distribution box (figure 4-30).
- ___ 4) Turn 2.2 V adjust knob clockwise until multimeter reads 2.25 V dc (2.85 V dc for columns 2 and 3).
- ___ c. Use a nonmetallic tool to adjust meter, if necessary, to 0. Do this by sliding power distribution box outward, removing top mesh cover, and adjusting 2.2 V METER ADJ screw at top of box.
- ___ 11. Disconnect multimeter test leads from power distribution box.
- ___ 12. Check low-temperature sensor voltage and, if necessary, adjust it as follows:
 - ___ a. Set multimeter to a scale that measures 10 V dc.

CAUTION

Place multimeter leads lightly on TB1 to prevent bending of the low-temperature assembly and a possible erroneous voltage reading.

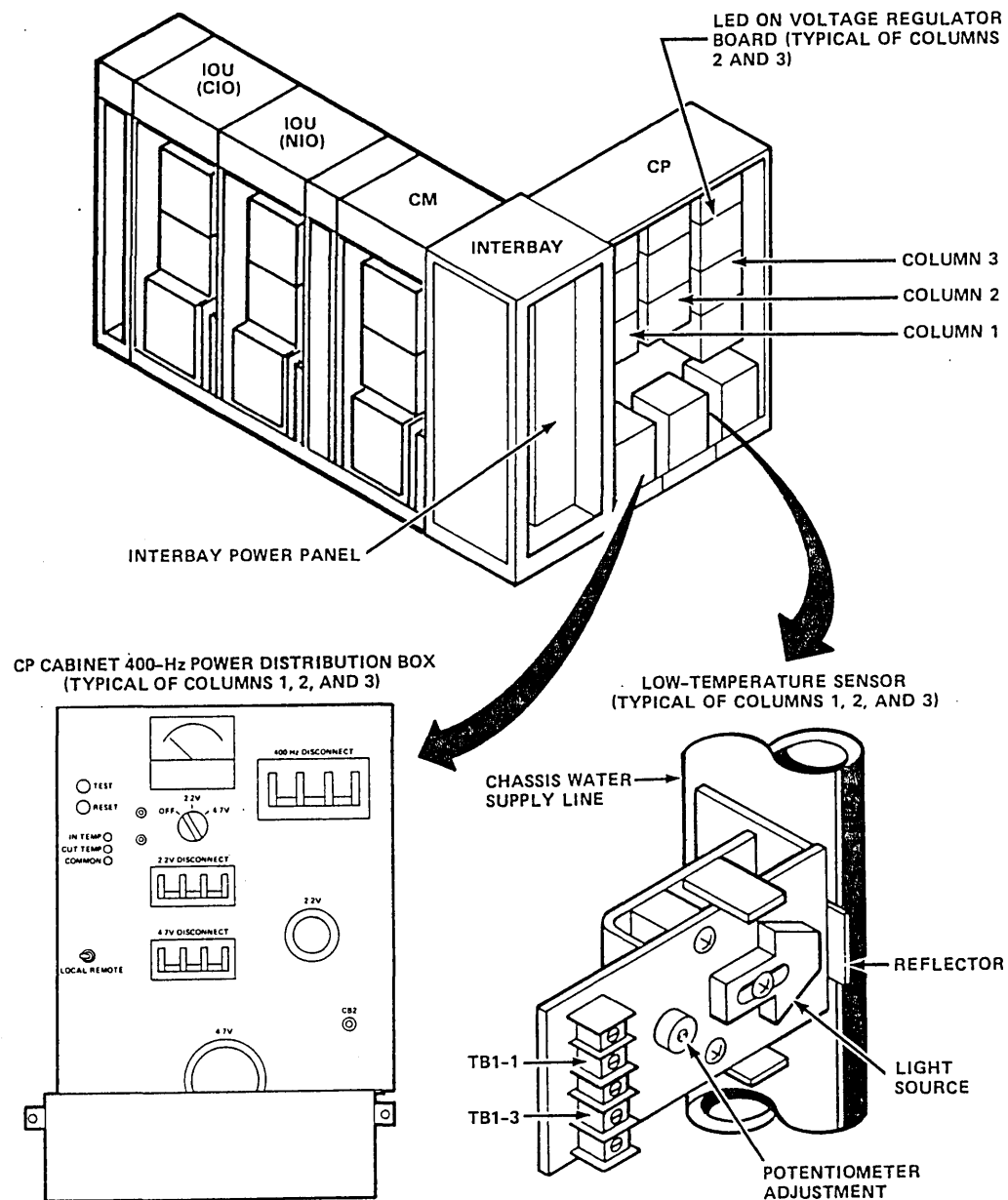
- ___ b. Place meter negative lead (-) on low-temperature sensor TB1-1 and positive lead (+) on TB1-3.
- ___ c. Check to see that multimeter reading is from 9.9 to 10.1 V dc. If voltage is not within this range, correct it by adjusting potentiometer on low-temperature sensor.
- ___ d. Remove multimeter leads from TB1.
- ___ 13. Set mode switch on front of power distribution box to REMOTE.
- ___ 14. Replace top mesh cover, and slide power distribution box back into column if meter adjustment was necessary. Do not reinstall retaining screws at front of box.
- ___ 15. Repeat steps 4 through 15 for CP column 2.
- ___ 16. Repeat steps 4 through 15 for CP column 3.

IS OPTIONAL CP-1 PART OF INSTALLATION?

- If yes, repeat this procedure for optional CP-1.
- If no, go to next procedure.

APPLYING SYSTEM POWER (Sheet 25 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CP-0 AND OPTIONAL CP-1 (Cont'd)



01305-3

Figure 4-30. CP Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 26 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CM

Use this procedure for applying 400-Hz power to the CM cabinet and adjusting its logic voltages.

Procedure prerequisite:

- All previous installation and checkout procedures are complete.

Equipment required:

- Digital multimeter, John Fluke Model 8020A or equivalent

Procedure:

- ___ 1. Set MEM 50/60-Hz circuit breaker and MEM 400-Hz circuit breaker on interbay power panel to ON.
- ___ 2. Set following circuit breakers and voltage adjust knobs on CM power distribution box (figure 4-31) as follows:
 - ___ a. MAIN DISCONNECT to OFF
 - ___ b. -2.2 V DISCONNECT to OFF
 - ___ c. +5.5 V DISCONNECT to OFF
 - ___ d. -5.2 V DISCONNECT to OFF
 - ___ e. -2.2 V ADJUST knob fully counterclockwise
 - ___ f. -5.2 V ADJUST knob fully counterclockwise
 - ___ g. +5.5 V ADJUST knob fully counterclockwise
 - ___ h. Mode switch on top of 400-Hz power distribution box to LOCAL
- ___ 3. Apply power by sequentially setting circuit breakers on power distribution box as follows:
 - ___ a. -2.2 V DISCONNECT to ON
 - ___ b. -5.2 V DISCONNECT to ON
 - ___ c. +5.5 V DISCONNECT to ON
 - ___ d. MAIN DISCONNECT to ON
- ___ 4. Press RESET button, located at upper right corner of power distribution box.
- ___ 5. Listen for circulating air to verify that CM blower is operating. If blower is not operating, remove power from CM and correct fault.
- ___ 6. Set digital multimeter to a V dc scale that measures 5.2 V.

APPLYING SYSTEM POWER (Sheet 27 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CM (Cont'd)

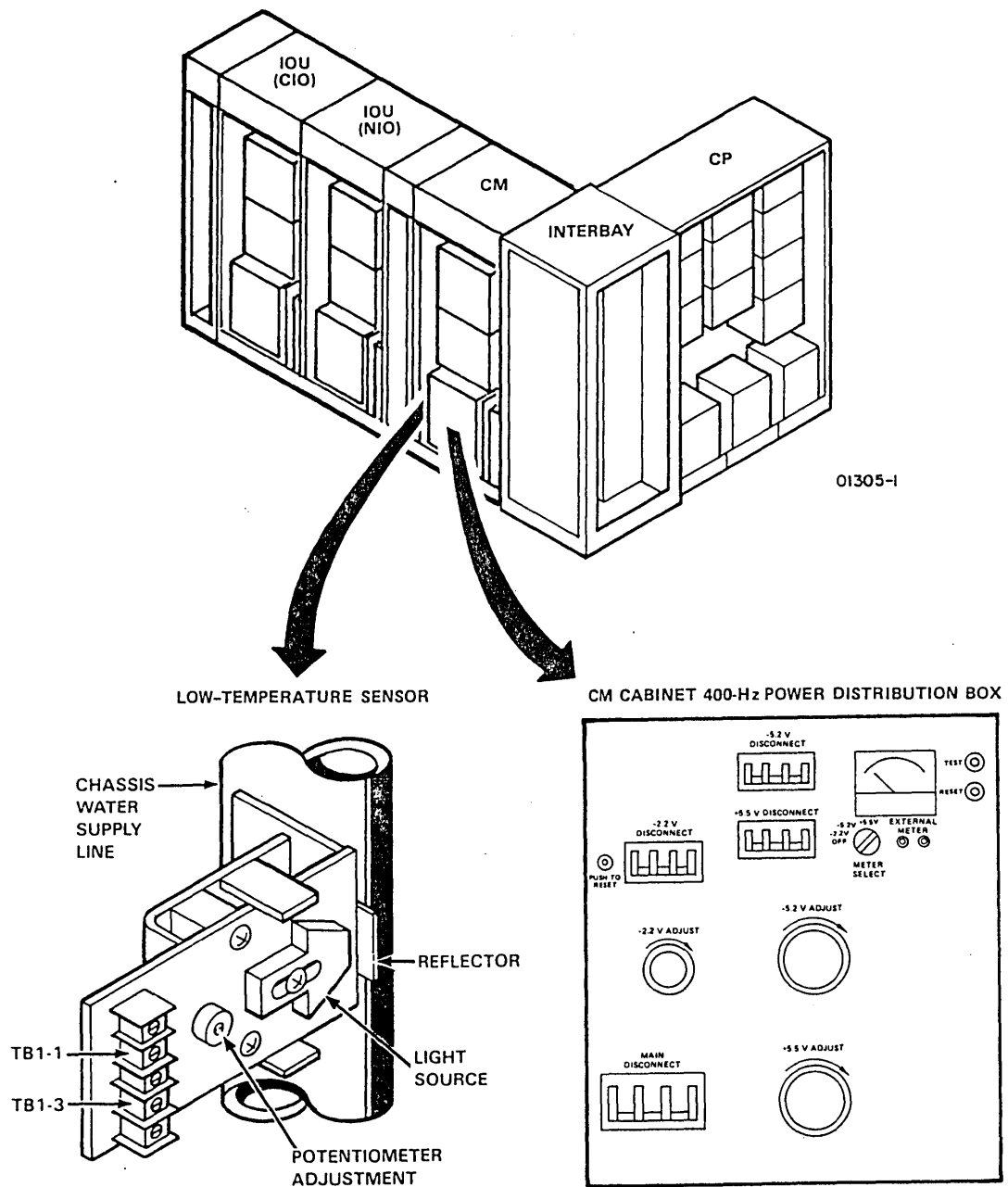


Figure 4-31. CM Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 28 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CM (Cont'd)

- ___ 7. Zero percentage meter on power distribution box (figure 4-32) as follows:
- ___ a. Set METER SELECT switch to OFF.
 - ___ b. Turn screw on front of percentage meter, if necessary, to align meter indicator at mechanical zero mark at far left of scale.

NOTE

The following voltage adjustments must be made in the order given.

- ___ 8. Adjust -5.2 V as follows:
- ___ a. Set METER SELECT switch to -5.2 V.
 - ___ b. Turn -5.2 V adjust knob on front of power distribution box slowly until multimeter indicates a nominal -5.2 V.

WARNING

Exposed terminals in power distribution box contain 110 V ac.

- ___ c. Adjust R5 at rear of percentage meter, if necessary, to obtain percentage meter indication of 0. Access to R5 requires removing retaining screw from power distribution box, swinging power box outward, and removing box top plate.
- ___ 9. Adjust -2.2 V as follows:
- ___ a. Set METER SELECT switch to -2.2 V.
 - ___ b. Turn -2.2 V adjust knob on front of power distribution box slowly until multimeter indicates a nominal 2.2 V.
 - ___ c. Adjust R4 at rear of percentage meter, if necessary, to obtain percentage meter indication of 0. Access to R4 requires removing retaining screw of power distribution box, swinging box outward, and removing box top plate.

APPLY POWER AND ADJUST VOLTAGES FOR CM (Cont'd)

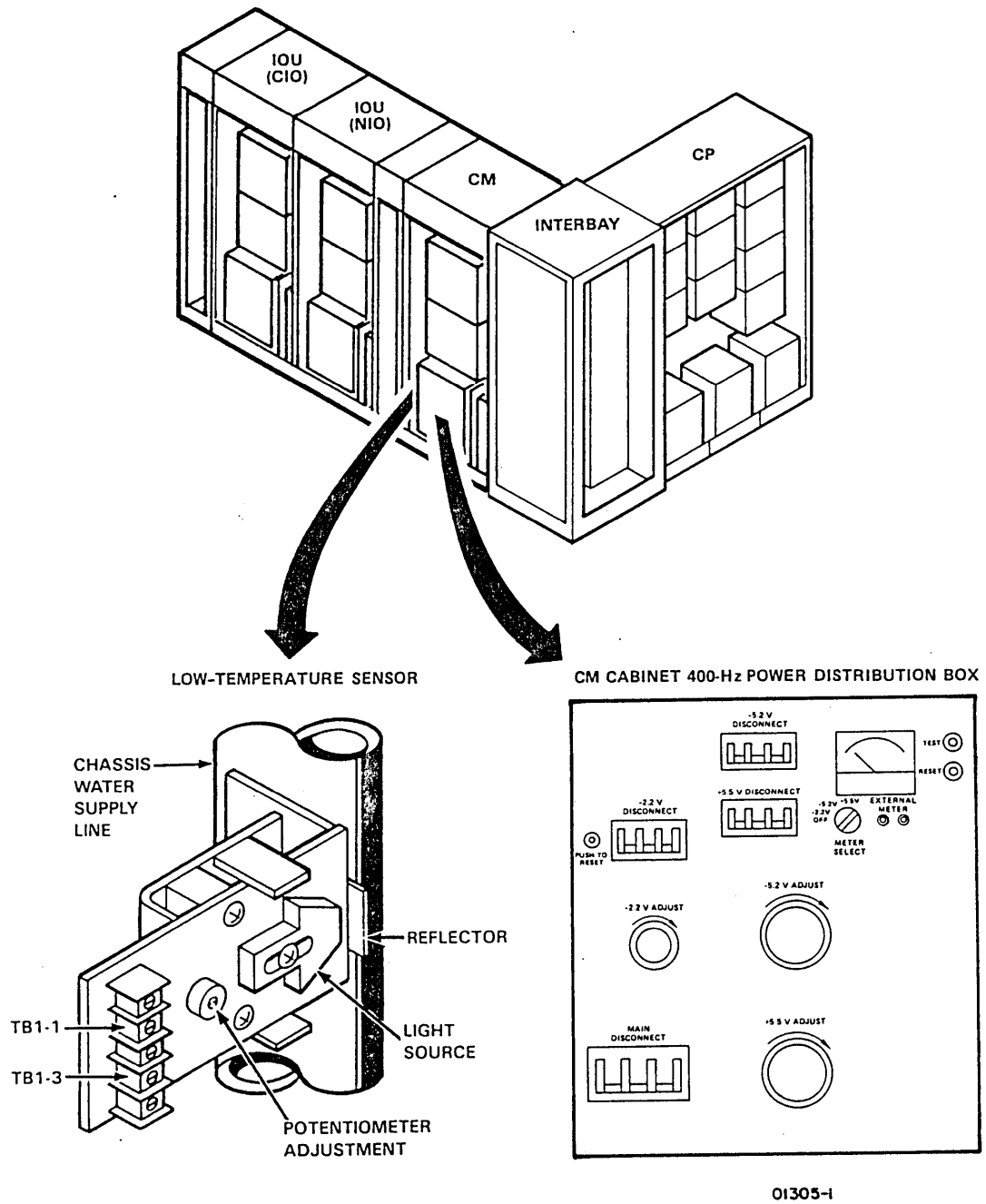


Figure 4-32. CM Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 30 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CM (Cont'd)

- ___ 10. Adjust +5.5 V as follows:
 - ___ a. Set METER SELECT switch (figure 4-33) to +5.5 V.
 - ___ b. Turn +5.5 V adjust knob on front of power distribution box slowly until multimeter indicates a nominal 5.5 V.
 - ___ c. Adjust R6 at rear of percentage meter, if necessary, to obtain percentage meter indication of 0. Access to R6 requires removing retaining screw of power distribution box, swinging box outward, and removing box top plate.
- ___ 11. Disconnect multimeter from power distribution box.
- ___ 12. Check low-temperature sensor voltage and, if necessary, adjust it as follows:
 - ___ a. Set multimeter to a scale that measures 10 V dc.

CAUTION

Place multimeter leads lightly on TB1 to prevent bending of the low-temperature sensor and a possible erroneous voltage reading.

- ___ b. Place meter negative lead (-) on low-temperature sensor TB1-1 and positive lead (+) on TB1-3.
- ___ c. Check to see that multimeter reading is from 9.9 V dc to 10.1 V dc. If voltage is not within this range, correct it by adjusting potentiometer on low-temperature sensor.
- ___ d. Remove multimeter leads from TB1.
- ___ 13. Set mode switch on top of power distribution box to REMOTE.
- ___ 14. Close power distribution box, if open, and install retaining screw.
- ___ 15. Observe voltage output of M-G set at DATA display on system power monitor (SPM).

If voltage output is between 118 V and 120 V, go to next step.

If voltage output is incorrect, adjust VOLTAGE ADJUST screw on front of SPM. Then recheck and adjust cabinet logic voltages as necessary. Repeat this action until M-G voltage and logic voltages are correct.

APPLYING SYSTEM POWER (Sheet 31 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CM (Cont'd)

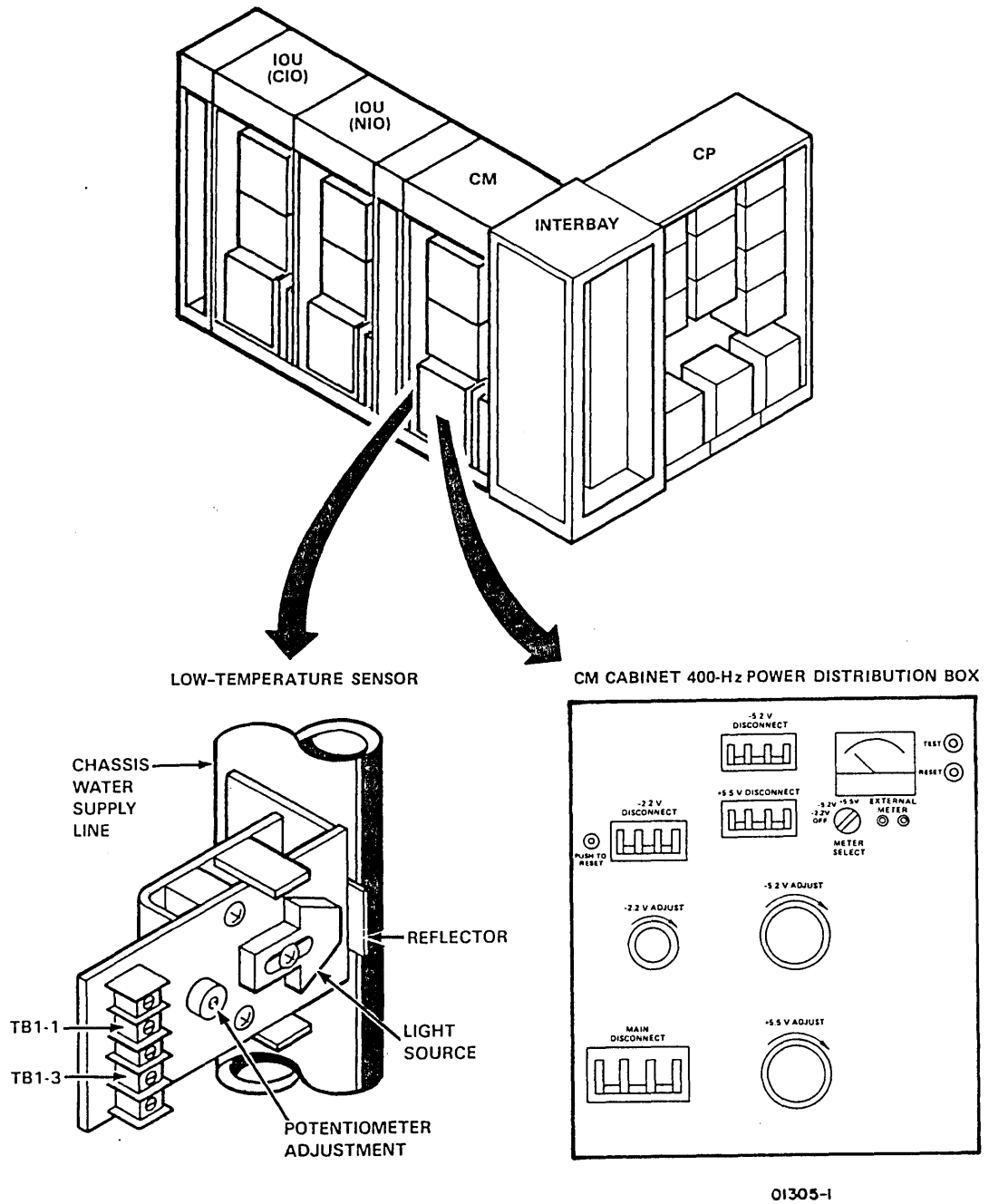


Figure 4-33. CM Power Controls and Adjustments

APPLYING SYSTEM POWER (Sheet 32 of 32)

APPLY POWER AND ADJUST VOLTAGES FOR CM (Cont'd)

- ___ 16. Read CHASSIS WATER TEMPERATURE gauge on each water cooling unit. Verify that gauge indicates between 16.7 °C and 21.5 °C (62 °F and 65 °F), 18.3 °C (63 °F) nominal. If gauge does not indicate a temperature within this range, turn water cooling unit TEMPERATURE CONTROL knob counterclockwise to decrease temperature and clockwise to increase temperature. Wait 15 min for temperature change to register accurately on gauge.
- ___ 17. Record time on flowchart for applying system power.

RECHECKING WATER FLOW RATES (Sheet 1 of 1)

Use this procedure to recheck the initial settings of the water flow rates through the central memory and central processor columns. This recheck is necessary after stabilization of the water flow through the central computer.

Procedure prerequisite:

- All previous procedures have been performed.

Procedure:

- ___ 1. Check to ensure that water flow meters on under-floor water manifolds have following flow rates:
 - ___ a. CP-0 and CP-1 column 1 flow rates are 11.3 L (3 gal) per min.
 - ___ b. CP-0 and CP-1 column 2 flow rates are 11.3 L (3 gal) per min.
 - ___ c. CP-0 and CP-1 column 3 flow rates are 15.1 L (4 gal) per min.
 - ___ d. CM flow rate is 7.6 L (2 gal) per min.
 - ___ e. IOU NIO cabinet 15.1 L (4 gal) min.
 - ___ f. IOU CIO cabinet 15.1 L (4 gal) min.
 - ___ g. Adjust control valves as necessary to correct water flow rates.
- ___ 2. Install all covers on flow meters.
- ___ 3. Check water cooling unit for following gauge readings:
 - ___ a. PUMP OUTLET PRESSURE gauge

For 60-Hz power, 27 psi to 55 psi.
For 50-Hz power, 27 psi to 35 psi.
 - ___ b. CHASSIS WATER TEMPERATURE gauge has a reading of 16.7 °C to 18.3 °C (62 °C to 65 °F).
 - ___ c. CHILLED WATER TEMPERATURE gauge has a reading of 4.4 °C to 10.0 °C (40 °F to 50 °F).

Make any necessary adjustments to obtain correct pressure and temperature. These adjustments are described in an earlier procedure in this section, Check Water Cooling Temperature.

The following power connections must be made by a licensed electrician under the supervision of a Control Data customer engineer or computer systems engineer. All local codes must be followed.

- Connecting 50/60-Hz and 400-Hz power to interbay power panel
- Connecting power to display station
- Connecting power to water cooling unit

Tools and parts required for the procedures include the following:

- Phillips screwdriver
- Slotted screwdriver
- Multimeter

CONNECTING 50/60-Hz AND 400-Hz POWER TO INTERBAY POWER PANEL (Sheet 1 of 4)

Use the following procedure to connect 50/60-Hz and 400-Hz power to interbay power panel.

Procedure prerequisites:

- 50/60-Hz power is off.
- 400-Hz power is off.
- Preinstallation power inspection is complete, and power wiring is correct.

Tools required:

- Phillips screwdriver
- Slotted screwdriver
- Ac voltmeter

Procedure:

NOTE

All power connections must be made by a licensed electrician under the supervision of a Control Data customer engineer or computer systems engineer. All local codes must be followed.

- ___ 1. Set to OFF all circuit breakers on 50/60-Hz and 400-Hz wall-mounted circuit breaker panels that connect power to power panel in interbay cabinet.
- ___ 2. Use screwdriver to remove two mounting screws and 50/60-Hz power box cover from interbay power panel (figure 5-1).
- ___ 3. Remove five mounting screws and 400-Hz power box cover from interbay power panel.
- ___ 4. Locate 50/60-Hz preinstalled wiring underneath the raised floor. Pull wiring carefully up through wiring cutout to 50/60-Hz power distribution box.
- ___ 5. Connect 50/60-Hz wiring to terminals inside 50/60-Hz power distribution as follows:

<u>50/60-Hz Wiring</u>		<u>Interbay Power Panel</u>
Neutral	to	TB1-1
Line 1	to	TB1-2
Safety ground	to	E1 Safety GND

CONNECTING 50/60-Hz AND 400-Hz POWER TO INTERBAY POWER PANEL (Sheet 2 of 4)

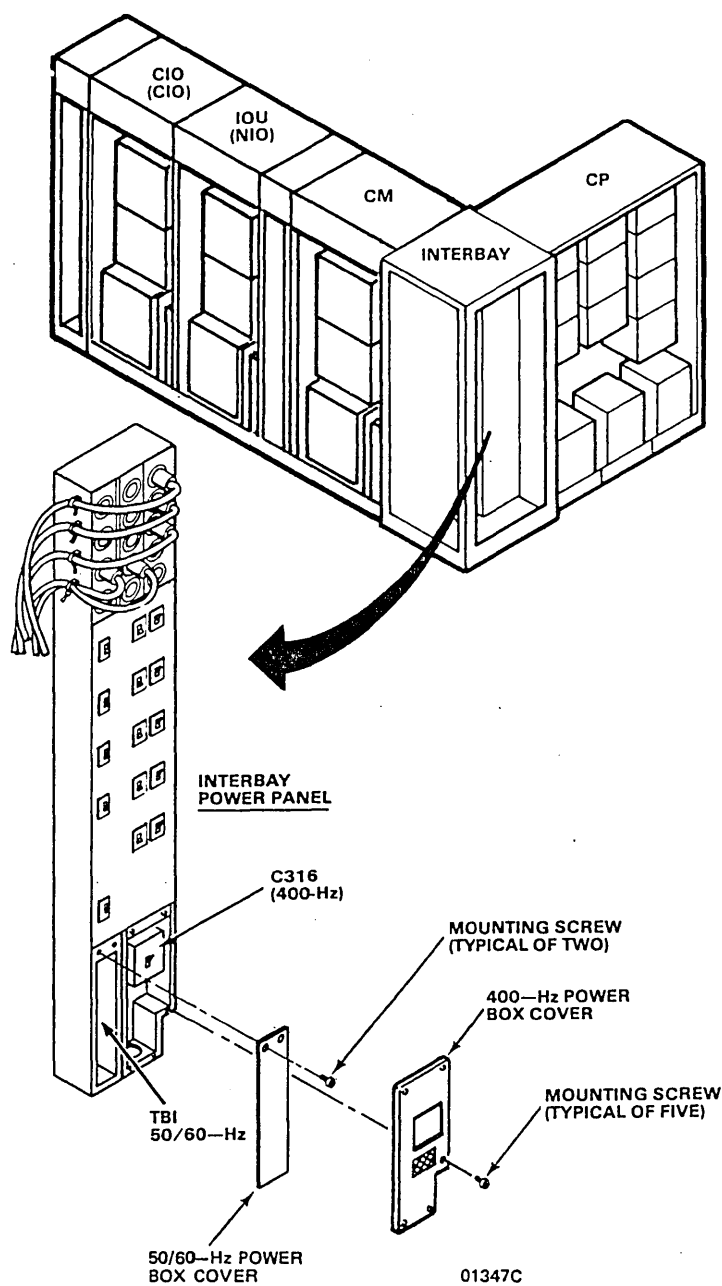


Figure 5-1. 50/60-Hz and 400-Hz Power Connections to Interbay Power Panel

CONNECTING 50/60-Hz AND 400-Hz POWER TO INTERBAY POWER PANEL (Sheet 3 of 4)

___ 6. Locate 400-Hz preinstalled wiring underneath raised floor. Pull wiring carefully up through wiring cutout to 400-Hz power distribution box.

___ 7. Connect 400-Hz wiring to terminals inside 400-Hz power distribution box as follows:

<u>400-Hz Wiring</u>		<u>Interbay Power Panel</u>
Neutral	to	400-Hz Neutral Terminal Strip
Line 1	to	CB16-1
Line 2	to	CB16-3
Line 3	to	CB16-5
Safety ground	to	E3

___ 8. Verify that circuit breakers CB15 and CB16 on front of interbay power panel are set to OFF.

WARNING

Dangerous voltages are present at exposed terminals in interbay power panel.

___ 9. Set wall-mounted 50/60-Hz circuit breaker for interbay power panel to ON.

NOTE

If following measured voltages are incorrect, set wall-mounted circuit breakers to OFF. Check and correct any incorrect wiring.

___ 10. Use ac voltmeter to measure and ensure that there is 120-V 50/60-Hz power between TB1-1 and TB1-2.

___ 11. Set wall-mounted 50/60-Hz circuit breaker for interbay power panel to OFF.

NOTE

400 Hz must be available from the M-G set to the wall-mounted circuit breakers.

CONNECTING 50/60-Hz AND 400-Hz POWER TO INTERBAY POWER PANEL (Sheet 4 of 4)

- ___ 12. Set wall-mounted 400-Hz circuit breaker for interbay power panel to ON.
- ___ 13. Use ac voltmeter to measure and ensure power between following terminals:
 - ___ a. N (neutral) to CB16-L1, 120 V ac
 - ___ b. N (neutral) to CB16-L2, 120 V ac
 - ___ c. N (neutral) to CB16-L3, 120 V ac
 - ___ d. CB16-L1 to CB16-L2, 208 V ac
 - ___ e. CB16-L1 to CB16-L3, 208 V ac
 - ___ f. CB16-L2 to CB16-L3, 208 V ac
- ___ 14. Set wall-mounted 400-Hz circuit breaker for interbay power to OFF.
- ___ 15. Install 50/60-Hz and 400-Hz power box covers.

CONNECTING POWER TO DISPLAY STATION (Sheet 1 of 2)

Use this procedure to connect 50/60-Hz and 400-Hz power to the CC545-C, D, E, or F display station.

Procedure prerequisites:

- Preinstallation wiring is complete.
- 50/60-Hz and 400-Hz power are removed from the preinstalled power wiring.
- The display station is placed over a precut cable cutout in the raised floor.

Procedure:

- ___ 1. Remove left side panel from display station (figure 5-2).
- ___ 2. Remove power input box cover.
- ___ 3. Pull power wiring up through floor and display station cable cutouts.
- ___ 4. Connect power wiring to power input box terminals as shown on wiring diagram on power input box cover.
- ___ 5. Install power input box cover.
- ___ 6. Leave left side panel off for later signal cable connections.

CONNECTING POWER TO DISPLAY STATION (Sheet 2 of 2)

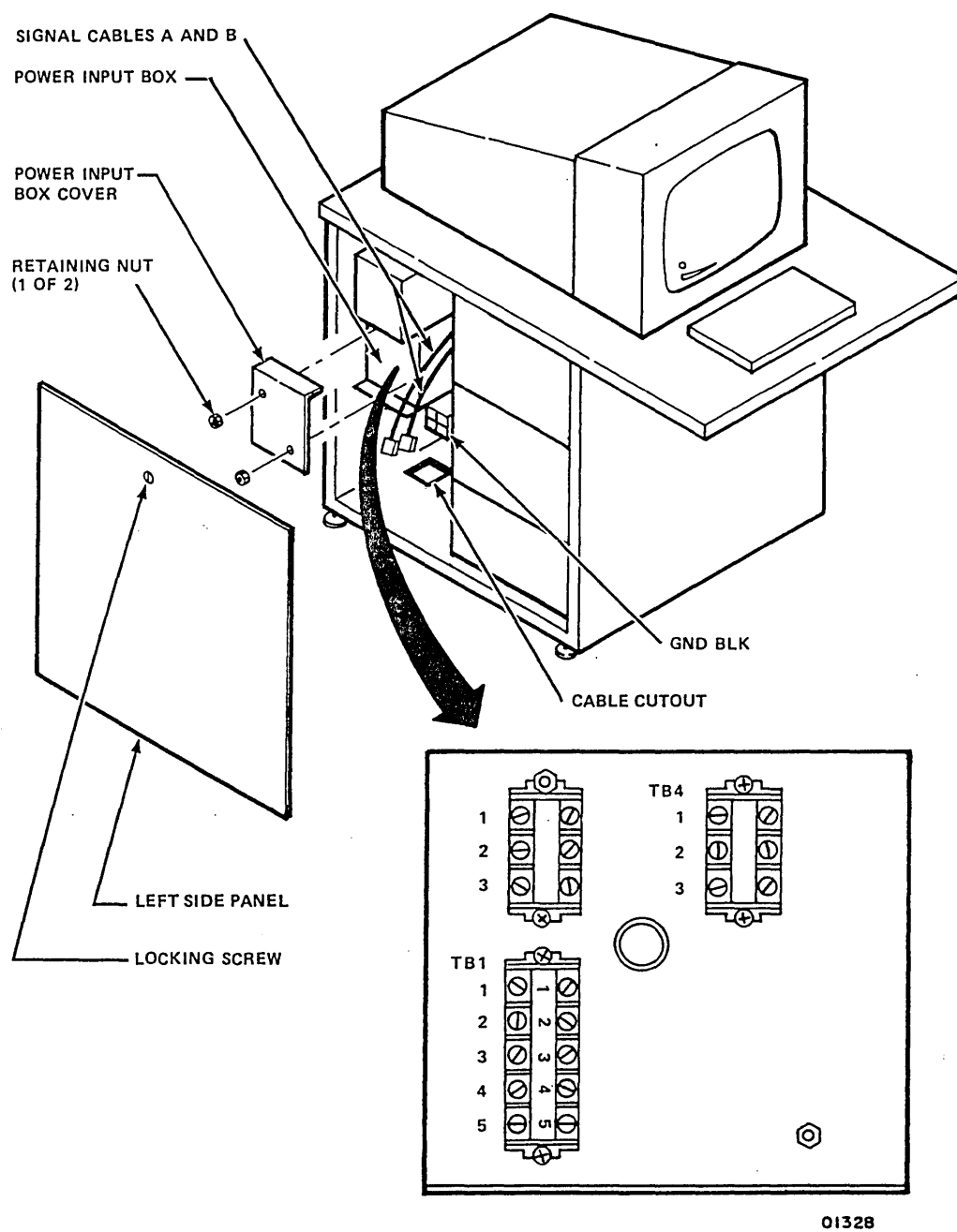


Figure 5-2. Power Connections to Display Station

CONNECTING POWER TO WATER COOLING UNIT (Sheet 1 of 5)

The water cooling units for the central computer may include a 102-L/min (27-gal/min) unit and one optional 102-L/m (27-gal/min) unit or one 220-L/min (58-gal/min) unit, depending on the system options. These water cooling units have drop cords with power plugs that connect directly to preinstalled power plugs at the computer site. When the site preinstalled power plugs are not installed and direct wiring connections are to be used in their place, the drop cords are not used and the direct wiring connections made in their place. The following procedures cover the optional direct power wiring connections.

- Connect power to 102-L/min (27-gal/min) water cooling unit.
- Connect power to 220-L/min (58-gal/min) water cooling unit.

CONNECTING POWER TO WATER COOLING UNIT (Sheet 2 of 5)

CONNECT POWER TO 102-L/min (27-gal/min) UNIT

Use this procedure to make direct 50/60-Hz power wiring connections to the 102-L/min (27-gal/min) water cooling unit and to the optional unit.

This procedure is necessary only as an option to power-plug connections that are most frequently used for the water cooling unit.

Procedure prerequisites:

- 50/60-Hz power to water cooling unit power wiring is off.
- Preinstallation power inspection is complete, and power wiring is correct.

Tools required:

- Phillips screwdriver
- Slotted screwdriver
- Multimeter

Procedure:

- ___ 1. Set INPUT POWER DISCONNECT switch on water cooling unit to ON.
- ___ 2. Use screwdriver to remove cover from water cooling unit power input box (figure 5-3).
- ___ 3. Check TB1 terminals in power input box. Use a multimeter, set it to an ohms scale, and check to be sure that no short circuits are present between SAFETY GROUND lug and following terminals.
 - ___ a. TB1-2
 - ___ b. TB1-3
 - ___ c. TB1-4
- ___ 4. Set INPUT POWER DISCONNECT switch on water cooling unit to OFF.

NOTE

All power connections must be made by a licensed electrician under the supervision of a Control Data customer engineer or a computer system engineer. All local codes must be followed.

CONNECTING POWER TO WATER COOLING UNIT (Sheet 3 of 5)

CONNECT POWER TO 102-L/min (27-gal/min) UNIT (Cont'd)

- ___ 5. Disconnect and remove power cord from power distribution box.
- ___ 6. Pull power wiring from 50/60-Hz wall-mounted circuit breaker up through power cutouts and into power input box.
- ___ 7. Connect power wiring to A5TBI in power input box as follows:

<u>50/60-Hz Wall-Mounted Circuit Breaker</u>		<u>Water Cooling Unit Power Input Box</u>
Neutral	to	TBI-1
Phase 1	to	TBI-2
Phase 2	to	TBI-3
Phase 3	to	TBI-4

- ___ 8. Connect 50/60-Hz utility ground wire to the SAFETY GROUND lug and connect safety ground wire from the interface box to the floor grid.
- ___ 9. Install cover on power input box.
- ___ 10. Repeat this procedure for second 102-L/min (27-gal/min) water cooling unit, if present.

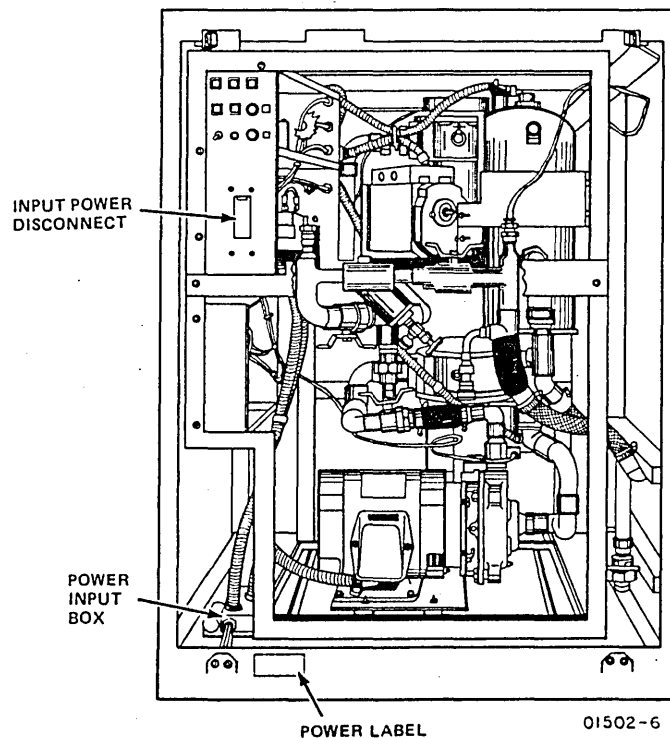


Figure 5-3. 50/60-Hz Power Connections to 102-L/min (27-gal/min) Unit

CONNECTING POWER TO WATER COOLING UNIT (Sheet 4 of 5)

CONNECT POWER TO 220-L/min (58-gal/min) UNIT

Use this procedure to make direct 50/60-Hz power wiring connections to the 220-L/min (58-gal/min) water cooling unit.

This procedure is necessary only as an option to power-plug connections that are most frequently used for the water cooling unit.

Procedure prerequisites:

- 50/60-Hz power to water cooling unit power wiring is off.
- Preinstallation power inspection is complete, and power wiring is correct.

Tools required:

- Phillips screwdriver
- Slotted screwdriver
- Multimeter

Procedure:

- ___ 1. Set INPUT POWER DISCONNECT switch on water cooling unit to ON.
- ___ 2. Use screwdriver to remove vented cover from power distribution box (figure 5-4).
- ___ 3. Check TB1 terminals in power distribution box. Use a multimeter, set it to an ohms scale, and check to be sure that no short circuits are present between SAFETY GROUND lug E1 and following terminals:
 - ___ a. TB1-2
 - ___ b. TB1-3
 - ___ c. TB1-4
- ___ 4. Set INPUT POWER DISCONNECT switch on water cooling unit to OFF.

NOTE

All power connections must be made by a licensed electrician under the supervision of a Control Data customer engineer or a computer system engineer. All local codes must be followed.

CONNECTING POWER TO WATER COOLING UNIT (Sheet 5 of 5)

CONNECT POWER TO 220-L/min (58-gal/min) UNIT (Cont'd)

- ___ 5. Disconnect and remove power cord from power distribution box.
- ___ 6. Pull power wiring from 50/60-Hz wall mounted circuit breaker up through power cutouts and into power distribution box.
- ___ 7. Connect power wiring to TB1 in power distribution box as follows:

<u>50/60-Hz Wall-Mounted Circuit Breaker</u>		<u>Water Cooling Unit Power Input Box</u>
Phase 1	to	TB1-2
Phase 2	to	TB1-3
Phase 3	to	TB1-4
Neutral	to	lug E1 (safety ground)

- ___ 8. Install power distribution box cover.

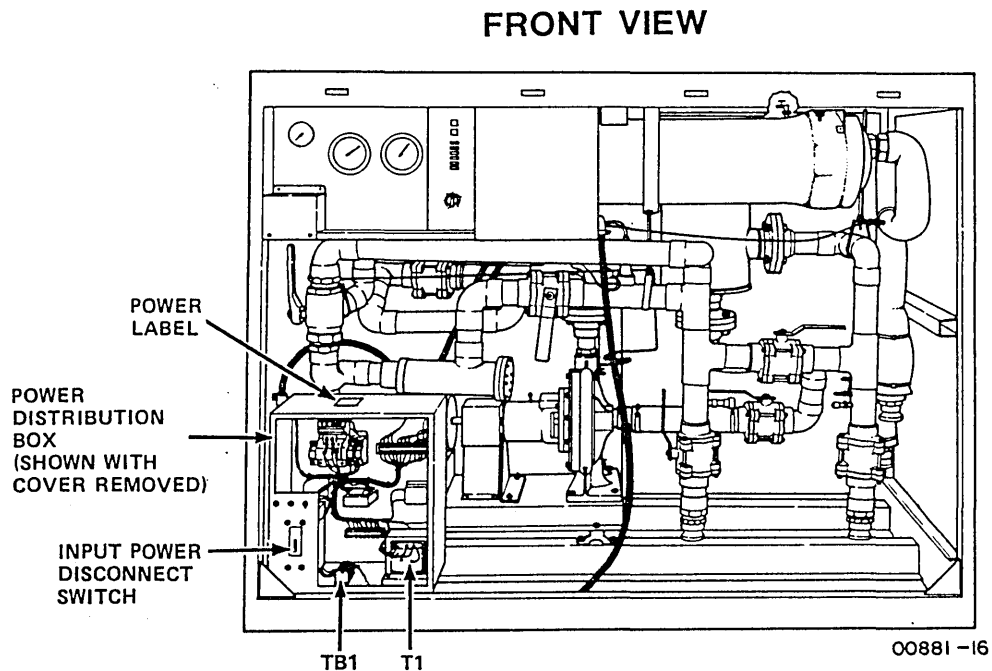


Figure 5-4. 50/60-Hz Power Connections to 220-L/min (58-gal/min) Unit

This section establishes a confidence level for determining that the central computer can run the operating system. The procedures are the following:

- Installing CIP
- Verifying diagnostics
- Checking warning systems
- Running network operation system validation suite
- Checking electromagnetic compatibility
- Installing and testing optional RTA equipment

Tools and parts required for the procedures include the following:

CIP tape

CYBER Initialization Package (CIP) User's Handbook

MSL 15X Off-line Maintenance Software Library Reference Manual

Aerosol coolant

Acoustic coupler

Acoustic coupler cable

INSTALLING CIP (Sheet 1 of 1)

Use this procedure to install the CYBER initialization package (CIP).

A CYBER initialization package, the CIP User's Handbook, and the MSL 15X Reference Manual are part of the central computer shipment to the computer site.

Procedure prerequisites:

- Installers have read all bulletins and special instructions supplied with the CYBER Initialization Package (CIP) User's Handbook (listed in the preface of this manual).
- Installers are familiar with the CIP and have the capability to set test parameters and modify command buffers as necessary.
- System peripheral equipment is installed and operating.

Equipment required:

- CIP tape with the latest FCO release and with the following:
 - Common Test and Initialization (CTI)
 - Maintenance Software Library (MSL)
 - Environmental Interface (EI)
 - Microcode
- C (checkout) tape
- CYBER Initialization Package User's Handbook, listed in the preface
- MSL 15X Off-line Maintenance Software Library Reference Manual, listed in the preface

Procedure:

- ___ 1. Update system date and time as follows:
 - ___ a. Check date and time with a keyboard entry of *T (CR).
 - ___ b. Change date and time by entering *SYMMDDHHMM (CR). Respectively, the entry requires year, month, day, hour, and minute.
- ___ 2. Refer to CIP User's Handbook, listed in the preface of this manual, to install CIP.
- ___ 3. Refer to MSL 15X Reference Manual for instructions on how to deadstart system and load Common Maintenance Software Executive (CMSE).
- ___ 4. Record time on flowchart for installing CIP.
- ___ 5. Install C tape, using TDX as follows:
 - ___ a. Select disk channel.
 - ___ b. Select tape channel.
 - ___ c. Select C option to load binaries for C test.
- ___ 6. Perform a deadstart by typing U,I,M (CR).

VERIFYING DIAGNOSTICS (Sheet 1 of 8)

Use the following procedures to run diagnostics under normal conditions, without voltage and clock margins.

Procedure prerequisites:

- The CIP is installed on the system disk according to instructions supplied with the CIP package.
- The C tape contains internal MIGDS checkout tests (part of CIP package) and is installed on the system disk according to instructions supplied with the C tape.
- The person performing this procedure has read all bulletins and special instructions supplied with the CIP package.
- The person performing these procedures is familiar with the CIP tapes and has the necessary software background to set test parameters and modify command buffers as necessary.

Procedure:

NOTE

The following procedure runs IOU and CP tests under normal conditions (no logic or clock margins set).

- ___ 1. Verify that CP, IOU, and CM logic voltages are set to 0 percent.
- ___ 2. Verify that switches on the master oscillator board at CM location A14 (figure 6-1) are set as follows:
 - S1 to CONT (down)
 - S2 to CONT (down)
 - S3 to NOM (middle)

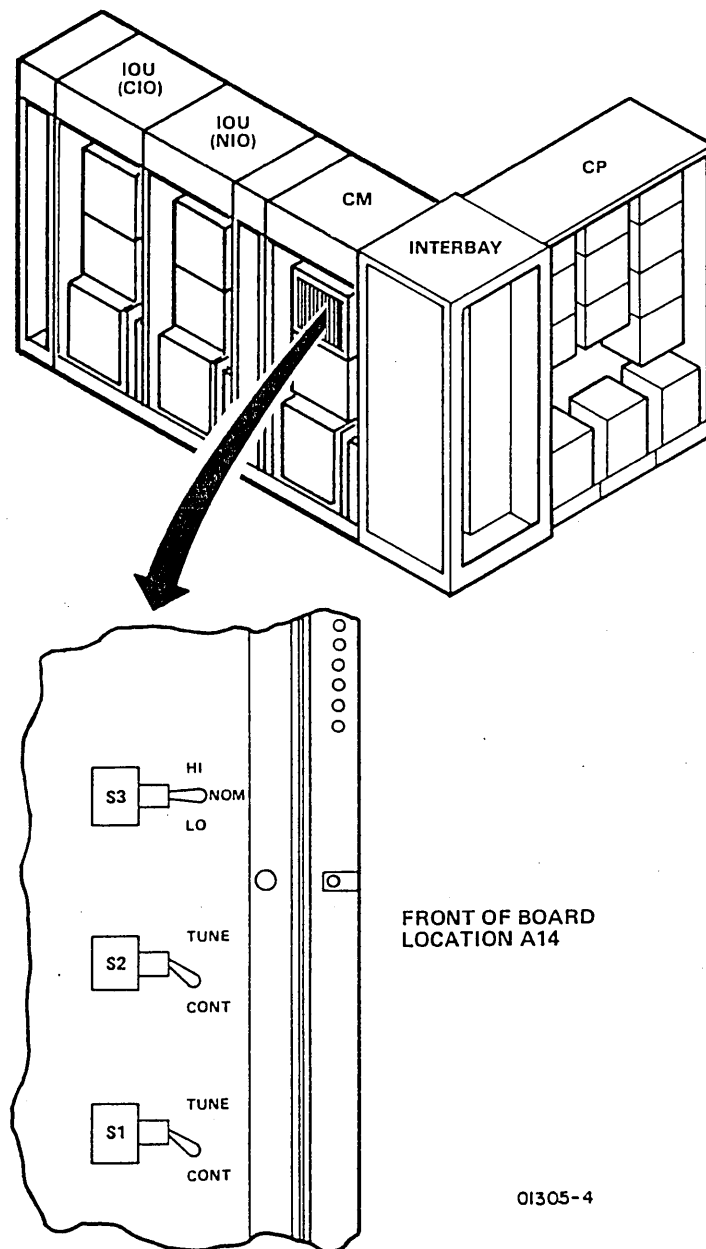


Figure 6-1. Master Oscillator Switch Locations

VERIFYING DIAGNOSTICS (Sheet 3 of 8)

___ 3. Initialize central computer as follows:

- ___ a. Verify that barrel and PPM configurations are set to 0.
- ___ b. If initializing is from a CC545 display station, press and release DEADSTART switch.

If initializing is from a CC634-B display station:

- 1) Press and hold CTRL.
 - 2) Type G. Then release CTRL.
 - 3) Wait for message.
 - 4) Press and hold CTRL.
 - 5) Type R.
- ___ c. Type L (CR).
 - ___ d. Select S option.
 - ___ e. Select U option.
 - ___ f. Select I option.
 - ___ g. Select M option (CR).

If any problems occur, refer to MSL 15X Maintenance Software Reference Manual listed in the preface of this manual.

Press and hold CTRL and G.

Wait for message, Operator Access Enabled.

___ 4. Run tests in table 6-1 as follows:

- ___ a. Type GO,FII40 (CR). FII40 runs QLT40 through MRT40 in sequence. Total run time is approximately 1 min and 30 s.

IS OPTIONAL CP-1 PRESENT?

- If yes, go to next question.
- If no, go to substep 4b.

- ___ b. Type GO,ALLMD3 (CR). ALLMD3 runs CMT3 through MAT3 in sequence. Run time varies depending on memory size.

Table 6-1. Single-CP System Diagnostic Tests

X	Command Buffer Name	Command Buffer Name	Type of Test	Number of Passes	Comments
()	LDS/EDS	FII40	IOU	1	Each barrel.
()	QLT40			1	
()	PMT40			1	
()	EXT40			1	
()	PMU40			1	
()	CHD40			1	
()	CMA40			1	
()	MRA40			1	
()	MRT40			1	
()	CMT3	ALLMD3	CP-0	1	
()	MCT3			1	
()	CST3			1	
()	IFT3			1	
()	CTT3			1	
()	OIT3			1	
()	ACT3			1	
()	LMT3			1	
()	SMT3			1	
()	ANT3			1	
()	MDT3			1	
()	BPT3			1	
()	PDT3			1	
()	ICT3			1	
()	MAT3			1	

VERIFYING DIAGNOSTICS (Sheet 5 of 8)

IS OPTIONAL CP-1 PRESENT?

- If yes, go to substep 4c.
- If no, go to next procedure.

- ___ c. Type GO,ALLMD3A (CR). ALLMD3A runs CMT3 through MAT3 in sequence for CP-0.
 - ___ d. Check off tests, and record any problems in space provided in table 6-2.
 - ___ e. Type GO,ALLMD3B (CR). ALLMD3B runs CMT3 through MAT3 in sequence for CP-1.
 - ___ f. Check off tests, and record any problems in space provided in table 6-2.
- ___ 5. Reload microcode, destroyed by ALLMD3 tests, as follows:
- ___ a. Press and release DEAD START switch at display station.
 - ___ b. Select U option.
 - ___ c. Select I option.
 - ___ d. Select M option (CR).

Table 6-2. Dual-CP System Diagnostic Tests

X	Command Buffer Name	Command Buffer Name	Type of Test	Number of Passes	Comments
()	CMT3	ALLMD3A	CP-0	1	
()	MCT3			1	
()	CST3			1	
()	IFT3			1	
()	CTT3			1	
()	OIT3			1	
()	ACT3			1	
()	LMT3			1	
()	SMT3			1	
()	ANT3			1	
()	MDT3			1	
()	BPT3			1	
()	PDT3			1	
()	ICT3			1	
()	MAT3			1	
()	CMT3	ALLMD3B	CP-1	1	
()	MCT3			1	
()	CST3			1	
()	IFT3			1	
()	CTT3			1	
()	OIT3			1	
()	ACT3			1	
()	LMT3			1	
()	SMT3			1	
()	ANT3			1	
()	MDT3			1	
()	BPT3			1	
()	PDT3			1	
()	ICT3			1	
()	MAT3			1	

NOTE

Use the following steps to run quick-look tests. When run without error, these tests provide 90 percent confidence that the central computer can run the operating system.

IS CP-1 PRESENT?

- If yes, go to step 8.
- If no, go to step 6.

- ___ 6. Type GO,INSTALL (CR). INSTALL runs CP tests shown in table 6-3 in sequence. Total run time is approximately 30 min.
- ___ 7. Check off tests, and record any problems in table. Go to step 12.

Table 6-3. Single-CP System Quick-Look Diagnostic Tests under Normal Conditions

X	Command Buffer Name	Command Buffer Name	Type of Test	Number of Passes (Decimal)	Comments
()	TRAP3	INSTALL	CP-0	1	
()	FCT93			1	
()	EXCH3			1	
()	CMEM3			5	
()	EXC3			512	
()	RIFS3			458	
()	RCT2			724	
()	SNGL3			6	
()	PAGE3			3	
()	CRPT3			21	
()	EXC3	-		2	Run this test out of each barrel.

- ___ 8. Type GO,INSTALA (CR). INSTALA runs CP-0 tests shown in table 6-4 in a dual-CP system in sequence.
- ___ 9. Check off tests, and record any problems in table.

VERIFYING DIAGNOSTICS (Sheet 8 of 8)

- ___ 10. Type GO, INSTALB (CR). INSTALB runs CP-1 tests shown in table 6-4 in a dual-CP system.
- ___ 11. Check off tests, and record any problems in table.
- ___ 12. Turn off all LED error indicators on IOU cards as follows:
- ___ a. Perform a deadstart.
- ___ b. Press M button to display maintenance option.
- ___ c. Enter CL (CR).
- ___ 13. Record time on flowchart for verifying diagnostics.

Table 6-4. Dual-CP System Quick-Look Diagnostic Tests Under Normal Conditions

X	Command Buffer Name	Command Buffer Name	Type of Test	Number of Passes (Decimal)	Comments
()	TRAP3	INSTALA	CP-0	1	
()	CMEM3			1	
()	RIFS			?	
()	RCFS3			458	
()	RCT23			724	
()	SNGL3			6	
()	PAGE3			3	
()	CRPT3			21	
()	TRAP3	INSTALB	CP-1	1	
()	FCT93			1	
()	EXCH3†			1	
()	CMEM3			1	
()	EXC3			512	
()	RIFS3			458	
()	RCFS3			458	
()	RCT23			724	
()	SNGL3			6	
()	PAGE3			3	
()	CRPT3			21	

†If IOU CIO is present, EXCH3 has to be run separately for each barrel of NIO. Use command buffer EXCH3L for lower barrel and EXCH3U for upper barrel.

CHECKING WARNING SYSTEMS (Sheet 1 of 10)

Checking the warning systems consists of the following tasks:

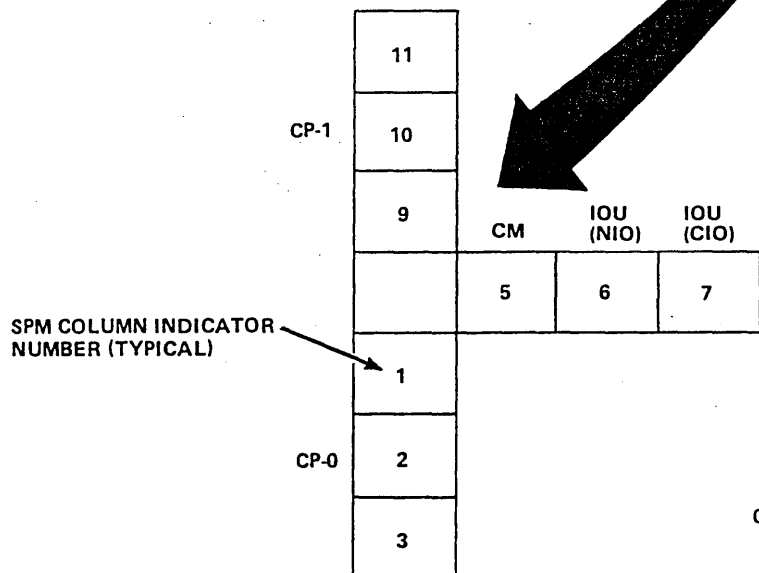
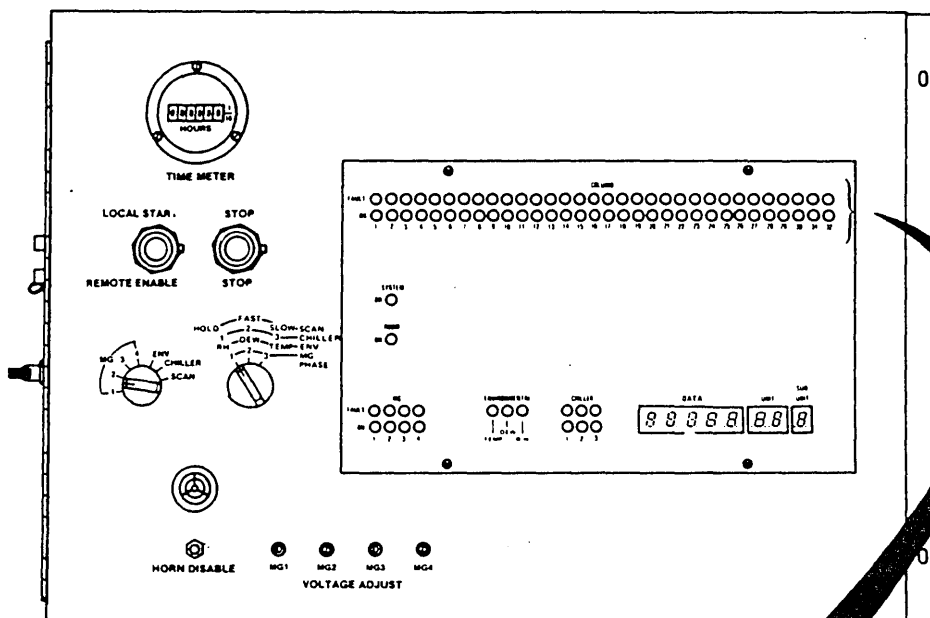
- Check CP low-temperature sensor and SPM cabling.
- Check CM low-temperature sensor and SPM cabling.
- Check 102-L/min (27-gal/min) unit warning cable to SPM.
- Check 220-L/min (58-gal/min) unit warning cable to SPM.

If unexpected results occur while performing these procedures, refer to the Power Distribution and Warning System Manual shown in the system publication index in the front of this manual to identify the problem.

Use figure 6-2 to relate FAULT and ON indicators on SPM to central processor columns and cabinets in the following steps.

- A FAULT indicator is red when on, and it indicates a fault from the column or unit being monitored. Indicators on the column or unit indicate the type of fault.
- An ON indicator is green when on, and it indicates the column or unit being monitored. To be monitored, a column or unit must be in the remote mode of operation.
- FAULT and ON indicators for the MG and water cooling units (CHILLER) work in the same way as those for the columns, and they are identified by the labeling on the SPM.

FRONT



01332-1

Figure 6-2. SPM Indicators

CHECKING WARNING SYSTEMS (Sheet 3 of 10)

CHECK CP LOW-TEMPERATURE SENSOR AND SPM CABLING

Use this procedure for checking the low-temperature sensor in the CP-0 and CP-1 cabinets.

Procedure prerequisite:

- All previous installation and checkout procedures are complete.

Procedure:

- ___ 1. Perform a deadstart.
- ___ 2. Type AR PO (CR) at display station. CP maintenance registers appear on display station screen.
- ___ 3. Type BRO. IOU registers appear on right side of display station screen.
- ___ 4. Type DK (CR). This clears status summary register.
- ___ 5. Set mode switch on front of CP-0 column 1 power distribution box to REMOTE.
- ___ 6. Place a small piece of paper between light source and reflector on low-temperature assembly on CP-0 column 1 water supply pipe (figure 6-3). Remove paper before 90 s to prevent removal of column 1 power. Observe the following while paper is in place.
 - ___ a. BACKUP LOW TEMP indicator on power distribution box lights.
 - ___ b. Horn sounds, and CP-0 column 1 warning light at SPM lights.
 - ___ c. Bit 63 in CP and bits 59 and 63 in IOU status summary registers set.
- ___ 7. Slide power supply back into CP-0 column 1. Install retaining screws.
- ___ 8. Repeat procedure for CP-0 column 2.
- ___ 9. Repeat procedure for CP-0 column 3.

IS OPTIONAL CP-1 PART OF INSTALLATION?

- If yes, repeat procedure for CP-1.
- If no, go to next procedure.

CHECK CP LOW-TEMPERATURE SENSOR AND SPM CABLING (Cont'd)

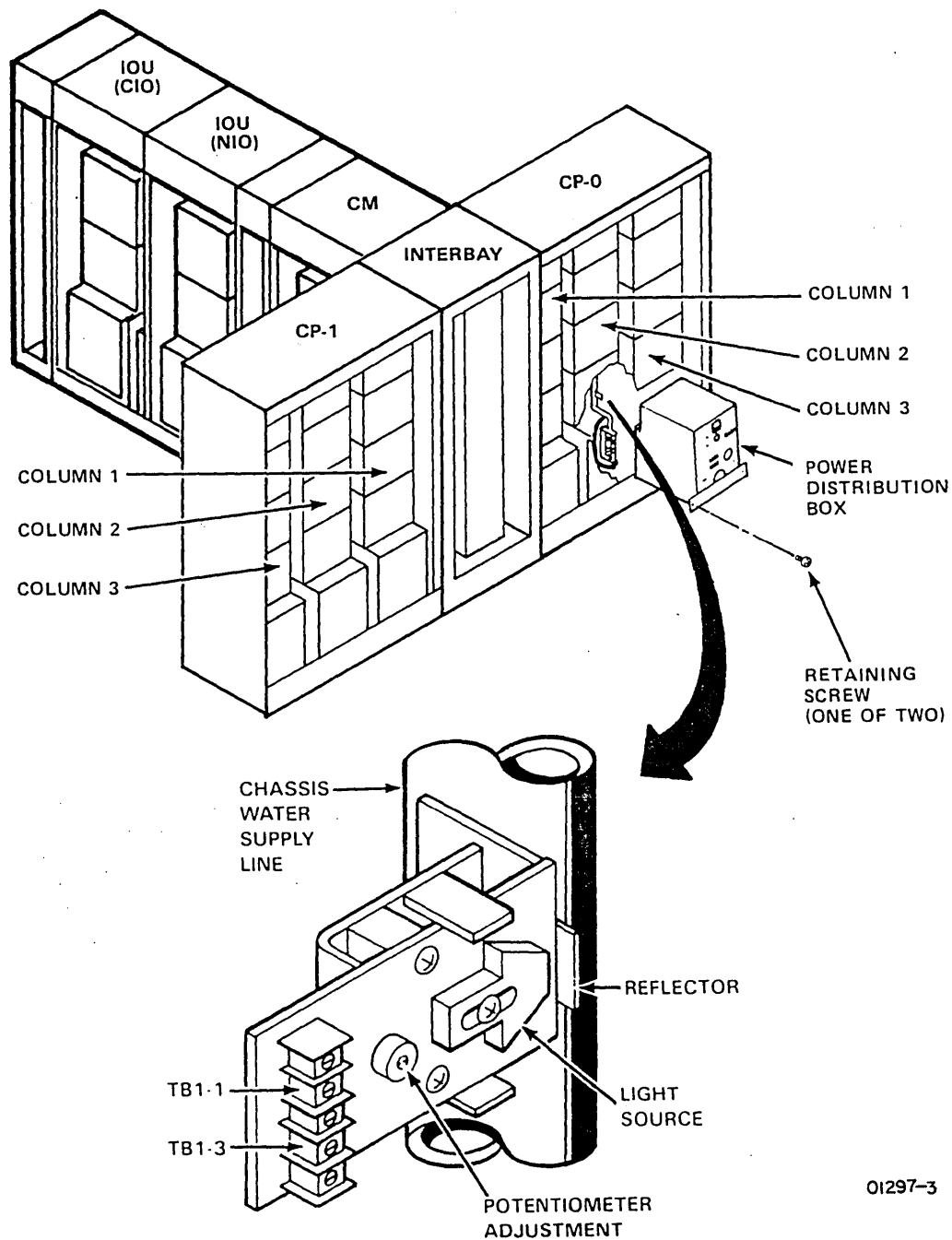


Figure 6-3. CP Low-Temperature Sensor

CHECKING WARNING SYSTEMS (Sheet 5 of 10)

CHECK CM AND IOU LOW-TEMPERATURE SENSOR AND SPM CABLING

Use this procedure for checking the low-temperature sensor in the CM and IOU cabinet.

Procedure prerequisite:

- All previous installation and checkout procedures are complete.

Procedure:

- ___ 1. Place a small piece of paper between light source and reflector on low-temperature assembly on CM water supply pipe (figure 6-4). Remove paper within 30 s to prevent removal of CM power. Observe the following while paper is in place.
 - ___ a. SPM horn sounds.
 - ___ b. SPM COLUMN 5 red indicator lights.
 - ___ c. LOW TEM indicator on top of power distribution assembly lights.
 - ___ d. Bit 63 in CP and bits 63 and 59 in IOU status summary registers set.
- ___ 2. Repeat this procedure for IOU NIO cabinet.
- ___ 3. Repeat this procedure for the optional IOU CIO cabinet.

CHECK CM AND IOU LOW-TEMPERATURE SENSOR AND SPM CABLING (Cont'd)

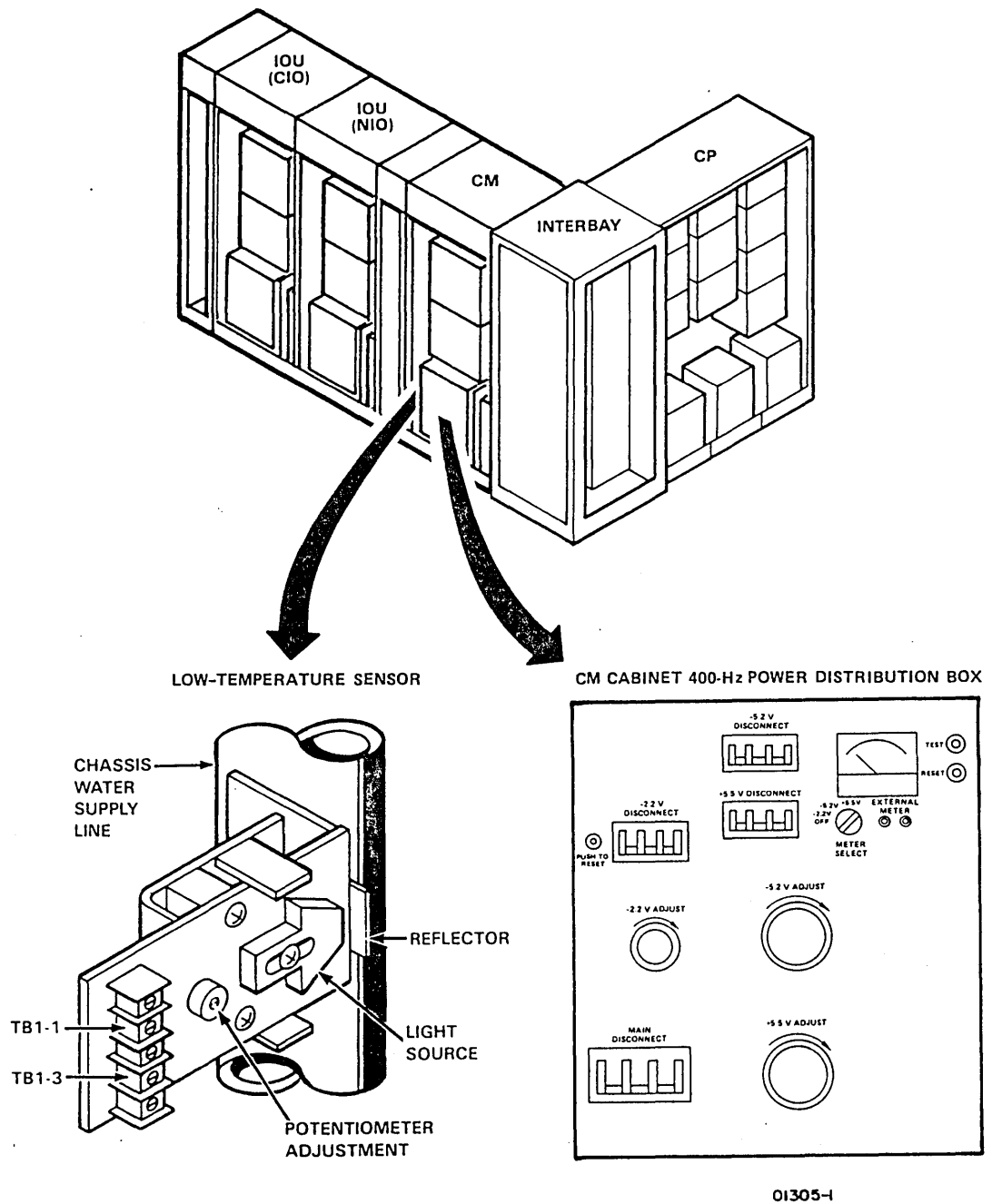


Figure 6-4. CM Low-Temperature Sensor

CHECKING WARNING SYSTEMS (Sheet 7 of 10)

CHECK 102-L/min (27-gal/min) UNIT WARNING CABLE TO SPM

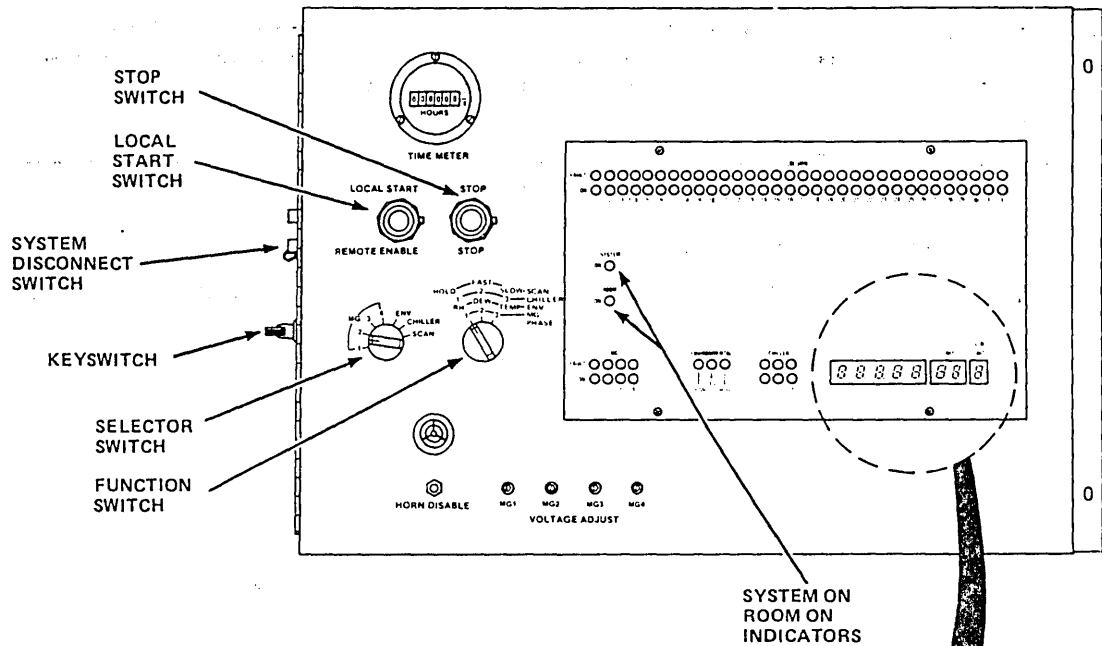
This procedure is performed on the low temperature (dew point) sensor assembly (figure 6-5). This is located beneath the modutrol motor on the water cooling unit.

Procedure:

- ___ 1. With pump running, insert a tie-wrap or something similar in the slotted groove at the bottom of the sensor (between the pipe and the light source).
- ___ 2. Observe the following reactions:
 - LOW TEMP fault indicator lights.
 - Pump stops running approximately eight seconds after fault was detected.
 - CHILLER fault light goes out on SPM.
- ___ 3. If reactions in step 2 did not occur, perform Low Temperature Fault Adjustment under Corrective Maintenance Adjustment Procedures.
- ___ 4. Remove tie-wrap and switch the INPUT POWER DISCONNECT circuit breaker off and on again. Indicator goes out and pump starts.

CHECKING WARNING SYSTEMS (Sheet 8 of 10)

CHECK 102-L/min (27-gal/min) UNIT WARNING CABLE TO SPM (Cont'd)



DISPLAY DETAIL

DATA	UNIT	SUB UNIT
0.0.0.0	0.0	0
68.7 °F	F	TEMP (ROOM)
34.3 % RELATIVE HUMIDITY	H	HUMIDITY (ROOM)
47.2 °F	D	DEWPOINT (ROOM) ¹
113.9 AC VOLTS NEUTRAL TO SELECTED PHASE	L	MG
46.7 VOLTS DC	L	COLUMN BEING SCANNED
62.4 WATER TEMP °F	L	CHILLER
		PHASE BEING METERED
		POWER SUPPLY BEING METERED

NOTE:

¹ IF EPROM 22109583 IS INSTALLED THEN THE DEWPOINT ACTUALLY DISPLAYS TEMPERATURE.

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Figure 6-5. 102-L/min (27-gal/min) Unit to SPM Cable Check

CHECKING WARNING SYSTEMS (Sheet 9 of 10)

CHECK 220-L/min (58-gal/min) UNIT WARNING CABLE TO SPM

Use this procedure to check the warning cable between the 220-L/min (58-gal/min) water cooling unit and the system power monitor (SPM). The procedure simulates a low-temperature condition at the water cooling unit to check the warning cable.

IS 220 L/MIN (58-gal/min) UNIT PART OF CENTRAL COMPUTER INSTALLATION?

- If yes, continue with this procedure.
- If no, ensure that checks for 102-L/min (27-gal/min) water cooling unit have been completed.

Procedure prerequisites:

- Previous checkout procedure are completed.
- Water cooling unit is operating.

Procedure:

- ___ 1. Remove front panel from water cooling unit if not previously removed.
- ___ 2. Set mode switch on water cooling unit to REMOTE. This can be done while unit is operating.
- ___ 3. Turn keyswitch on left side of SPM to LOCAL. This can be done while SPM is operating.
- ___ 4. Set selector switch on SPM to CHILLER.
- ___ 5. Set function switch on SPM to CHILLER 1. UNIT digital display on SPM indicates C1 (chiller 1). DATA digital display on SPM indicates CP-0, CMC, CM, and IOU chassis water temperature. This temperature should be within ± 2 °F of temperature indicated on water cooling unit CHASSIS WATER TEMPERATURE gauge.
- ___ 6. Insert a piece of paper between light source and reflector on low-temperature assembly in 220-L/min (58-gal/min) water cooling unit (figure 6-6). A fault indication occurs at water cooling unit and SPM indicators. Lighted fault indicator at SPM indicates a proper warning line connection between water cooling unit and SPM.
- ___ 7. Install panels on water cooling unit.
- ___ 8. Record time on flowchart for checking warning systems.

CHECKING WARNING SYSTEMS (Sheet 10 of 10)

CHECK 220-L/min (58-gal/min) UNIT WARNING CABLE TO SPM (Cont'd)

220-L/min (58-gal/min) WATER COOLING UNIT FRONT VIEW

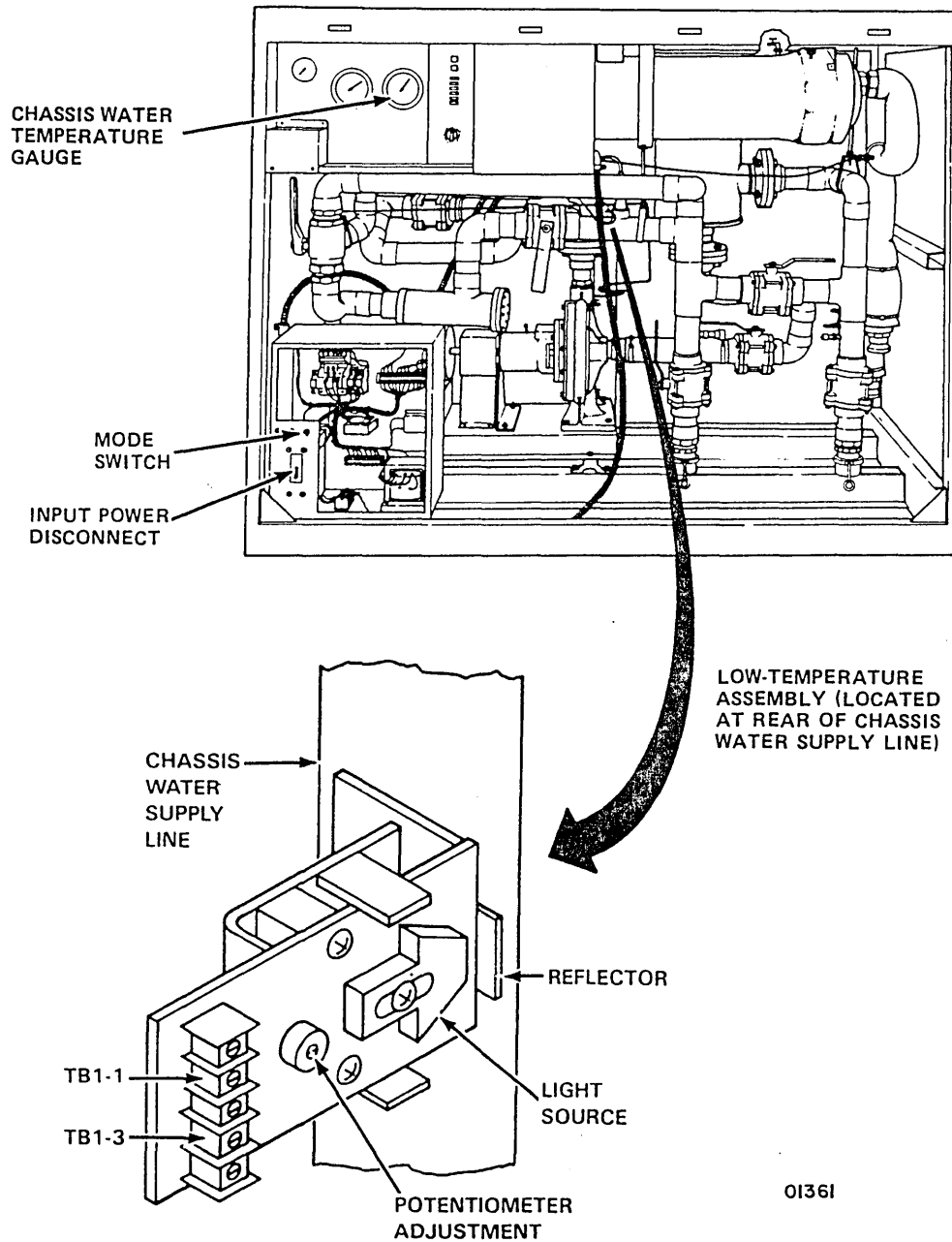


Figure 6-6. 220-L/min (58-gal/min) Unit to SPM Cable Check

RUNNING NETWORK OPERATING SYSTEM VALIDATION SUITE (Sheet 1 of 1)

Refer to the NOS and NOS/VE System Validation Suite User's Guide to test CYBER 180 mainframe hardware features in a NOS/VE operating system environment.

CHECKING ELECTROMAGNETIC COMPATIBILITY (Sheet 1 of 1)

Refer to CAMS 11 MIFTAPE (PN 12322211), and perform GRND procedures to test the electromagnetic compatibility (EMC) of the central computer.

INSTALLING AND TESTING OPTIONAL RTA EQUIPMENT (Sheet 1 of 5)

Use this procedure to install and checkout the optional remote technical assistance (RTA) equipment.

Procedure prerequisites:

- Power outlet installed within 2 m (6 ft) of RTA equipment installation:
For installations in the United States or Canada, 120-V, 60- Hz.
For international installations, 220/440-V, 50-/60-Hz.
- A telephone installed within 2 m (6 ft) of the modem location.
- A telephone line installed within 2 m (6 ft) of the modem location. Telephone line must have an RJ11C standard modular jack installed by the telephone company.

Tools and equipment required:

- Phillips screwdriver
- Slotted screwdriver
- Two remote RTA shielded cables (P/N 67185786). One ships with system. The other is a acquired as a special tool.
- Logic analyzer, when utilized.
- Racal Vadic Modem:

For United States installations, use model 2400PA (P/N 75447467).

For Canadian installations, use model 2400PA-C (P/N 75447468).

For international installations, refer to recommendations in Field Management Summary 1722.

Procedure:

- ___ 1. Unpack modem and inspect it for physical damage.
- ___ 2. Set modem with its top down.

INSTALLING AND TESTING OPTIONAL RTA EQUIPMENT (Sheet 2 of 5)

CAUTION

After removal of screws from bottom of modem, circuit board within modem is loose and may fall out if modem is tipped.

- ___ 3. Remove four screws from bottom cover.
- ___ 4. Hold modem top and bottom covers together and turn modem right side up.
- ___ 5. Remove top cover.
- ___ 6. Locate jumper location N on modem circuit board (figure 6-7).
- ___ 7. Remove jumper plug, normally connected to only one of two pins at location N. Reconnect jumper plug so that it connects to both pins at location N.
- ___ 8. Replace top of modem case and four bottom screws.
- ___ 9. Install modem within 2 m (6 ft) of system display station, using procedures in Section 2 of modem Installation and Operation Manual (supplied with modem). Exceptions to the modem installation procedures are the following:
 - ___ a. Do not perform installation step 1 which connects a cable from your terminal into the connector labeled DTE on the rear panel of the modem.
 - ___ b. Do not perform the modem installation step 7.
 - ___ c. Instead of the DTR indicator being off, it will turn on immediately upon applying power to the modem.

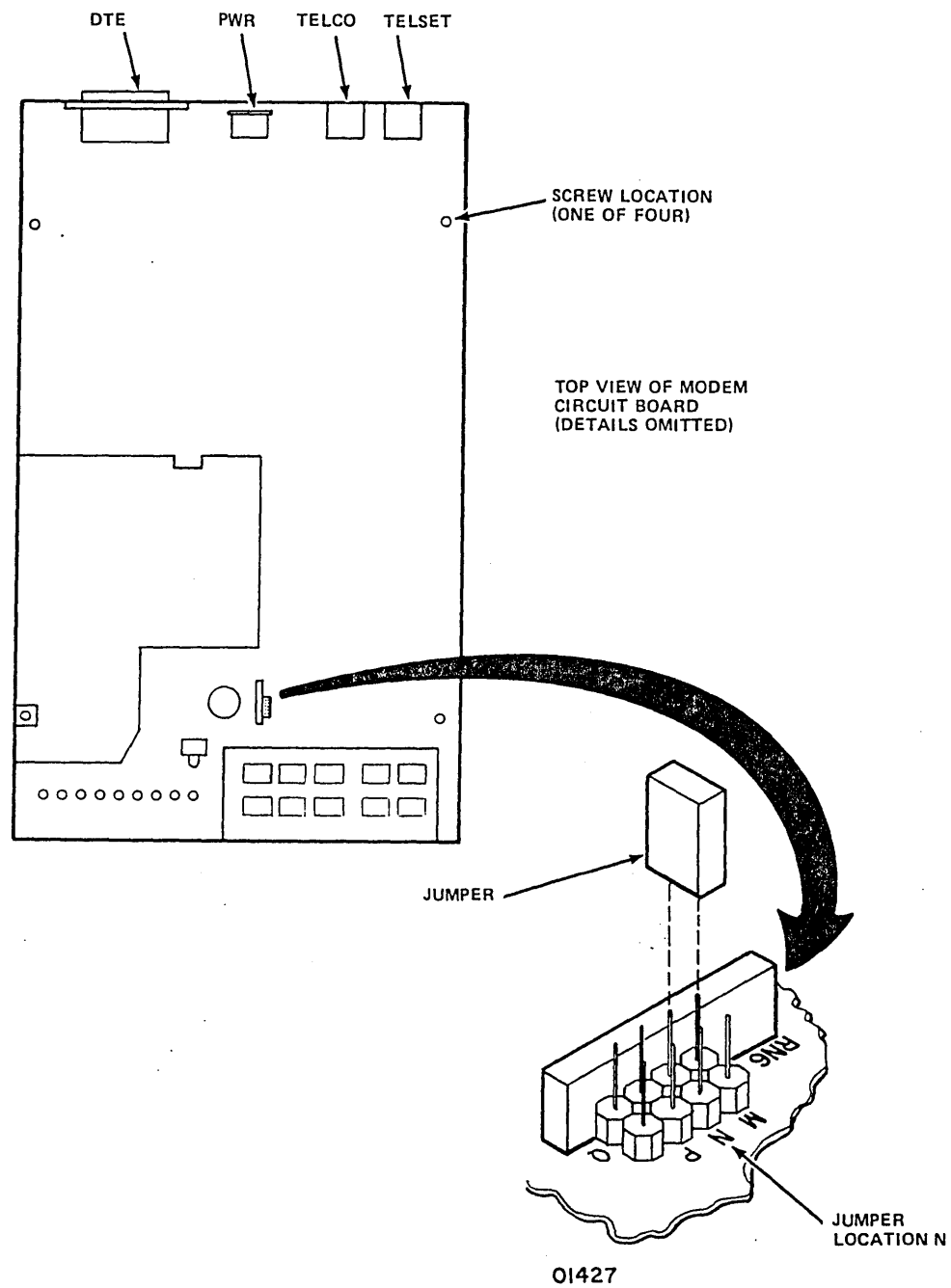


Figure 6-7. Modem Circuit Board

INSTALLING AND TESTING OPTIONAL RTA EQUIPMENT (Sheet 4 of 5)

- ___ 10. Route and connect one RTA cable from IOU (NIO section) front connector panel TERMINAL 1 to DTE connector on modem (figure 6-8).
- ___ 11. Route second RTA cable from connector J7 on logic analyzer to modem. Connect this cable to DTE on modem only when instructed to do so by World Support Center.
- ___ 12. Set BAUD RATE SELECTION switch for port 1 on front of IOU CIO cabinet to 2400 BPS.
- ___ 13. Set PORT OPTIONS PORT 1 keyswitch on front of IOU CIO cabinet to DS&PWR ENABLED.
- ___ 14. Apply power to logic analyzer, if used. Initialize analyzer and set its baud rate to 2400.
- ___ 15. Call World Support Center and arrange to checkout link remotely.
- ___ 16. Remove power from logic analyzer, if used. Disconnect and store analyzer and second RTA cable until it is needed for troubleshooting purposes.

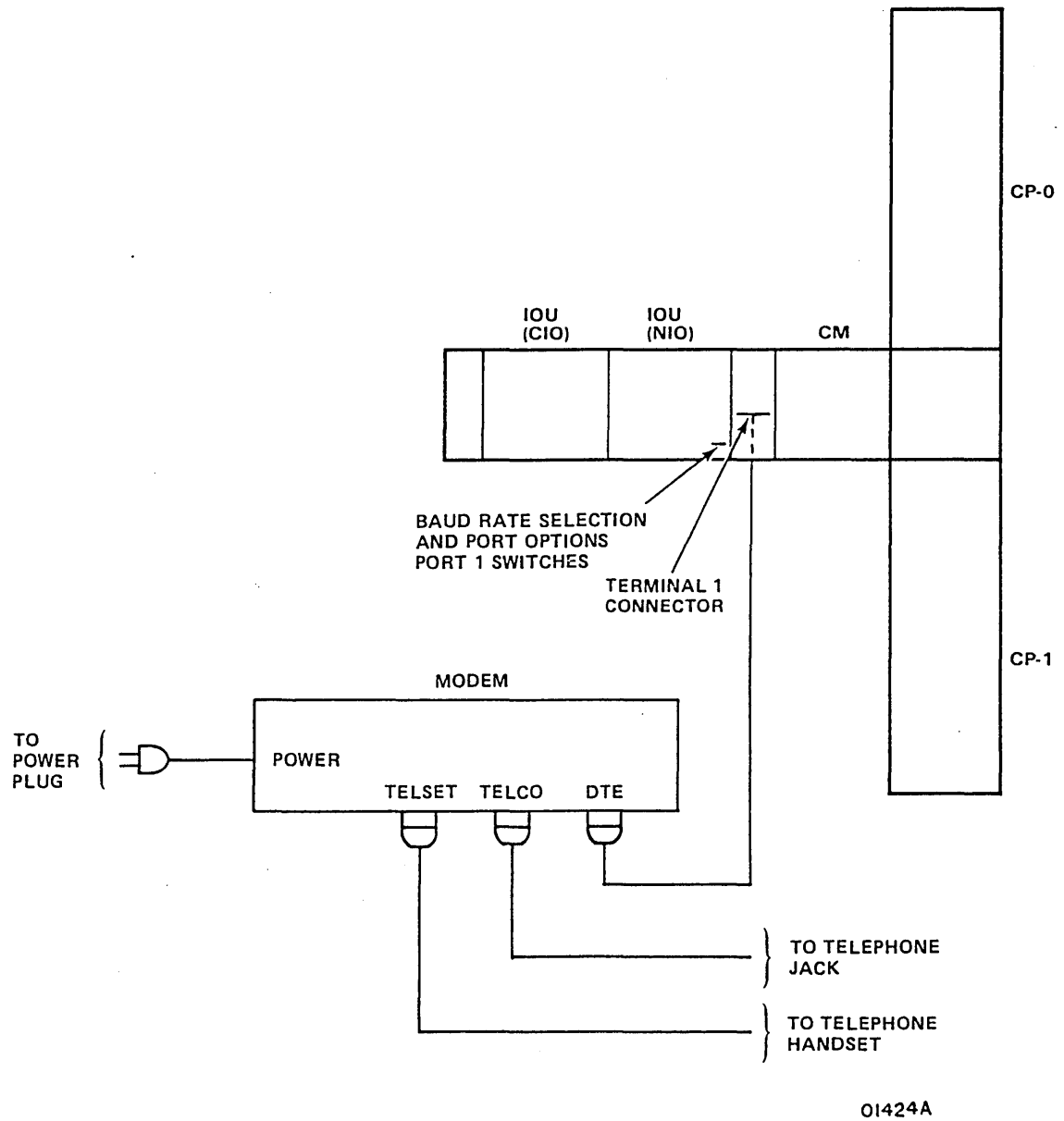


Figure 6-8. RTA Equipment Connections

COMMENT SHEET

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Hardware Reference Manual

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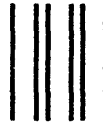
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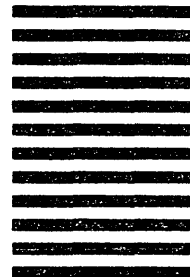
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